APR 19 1926

Rock Products

With which is Incorporated **CEMENT and ENGINEERING NEWS** Founded 1896

Chicago, April 17, 1926 (*Issued Every Other Week*) Volume XXIX, No. 8

ATLAS ROCK COMPANY

Stockton, Calif., Mar. 4, 1926.

The Fate-Root-Heath Co.,
Plymouth, Ohio.

Gentlemen:

Our Plymouth 18-ton Gasoline Locomotive is giving wonderful service and will outpull our 21-ton steamer.

The Plymouth is hauling three Western-Air-Dump cars, each loaded with 25 tons of gravel, total weight of cars and load 135 tons, up 1¼ % grades with 30 degree curves. The haul is one mile long and we make about 2½ trips per hour. We could do better than this if we could load faster.

Accurate cost records show average daily cost of operation, including fuel, labor, repairs and every charge against each unit as follows:

21-ton Steamer, .04183 cents per ton hauled.
18-ton Plymouth, .02703 cents per ton hauled.

Very truly yours,
ATLAS ROCK COMPANY.
(Signed) by Fred R. Beerman,
Gen. Mgr.

Haulage Cost Cut 35.35%~

For a number of years the Atlas Rock Co. of Stockton, Calif., have used steam haulage, but it was slow and expensive.

Then they put a Plymouth 18-ton Gasoline Locomotive on the job.

The Plymouth not only outpulled their 21-ton steamer, but it also cut their haulage cost from .04183 to .02703 cents per ton hauled—a direct saving of 35.35%.

If you are still using steam haulage it will pay you to investigate the Plymouth.

Made in 3 to 25-ton sizes, and in any track gauge.

THE FATE-ROOT-HEATH CO., Plymouth, Ohio

PLYMOUTH
Gasoline Locomotives

MEMBER A. B. C. *The Only Paid Circulation in this Industry* MEMBER A. B. P.

Printing of This Issue Is 5300 Copies. Next Issue Will Be May 1

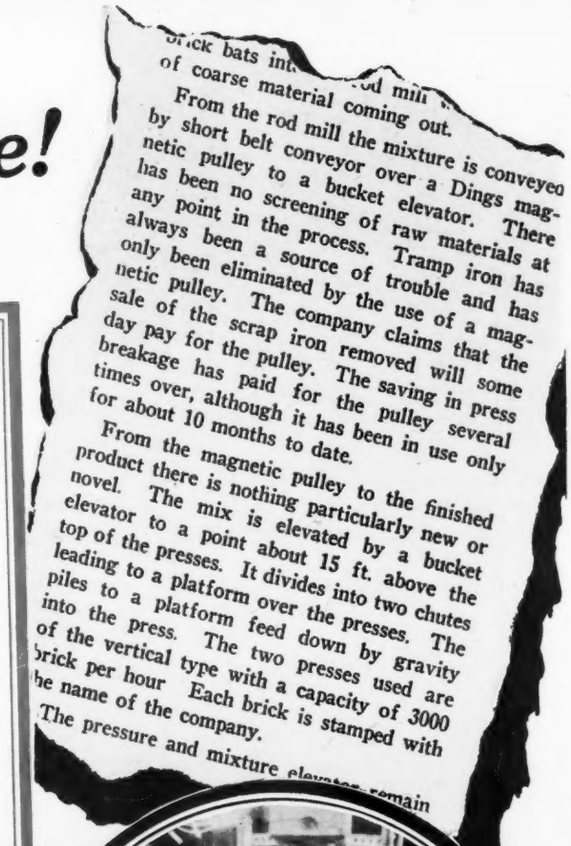
Eliminating Press Breakage!

THE Sand Lime Products Co. of Detroit has found the way to eliminate press breakage—a Dings High Intensity Magnetic Pulley is on guard, turning aside the tramp iron.

There are two Dings Pulleys paying for themselves in this great plant. One protecting the brick presses and the other guarding the hammer mill. But read what Rock Products says—good reasons for your installing a Dings.

Dings Magnetic Separator Co.
803 Smith St., Milwaukee, Wis.

Dings High Intensity MAGNETIC SEPARATION

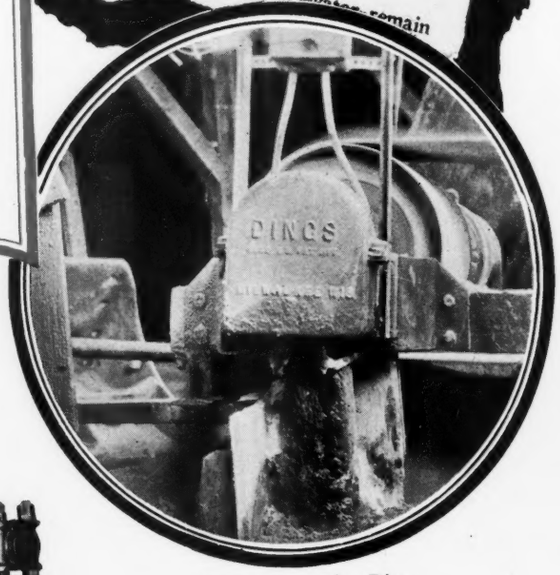


...ick bats int... ...od mill ...
of coarse material coming out.

From the rod mill the mixture is conveyed by short belt conveyor over a Dings magnetic pulley to a bucket elevator. There has been no screening of raw materials at any point in the process. Tramp iron has always been a source of trouble and has only been eliminated by the use of a magnetic pulley. The company claims that the sale of the scrap iron removed will some day pay for the pulley. The saving in press breakage has paid for the pulley several times over, although it has been in use only for about 10 months to date.

From the magnetic pulley to the finished product there is nothing particularly new or novel. The mix is elevated by a bucket elevator to a point about 15 ft. above the top of the presses. It divides into two chutes leading to a platform over the presses. The piles to a platform feed down by gravity into the press. The two presses used are of the vertical type with a capacity of 3000 brick per hour Each brick is stamped with he name of the company.

The pressure and mixture elevator remain



Brick press under Dings protection.

Dings Pulley catching tramp iron at press.

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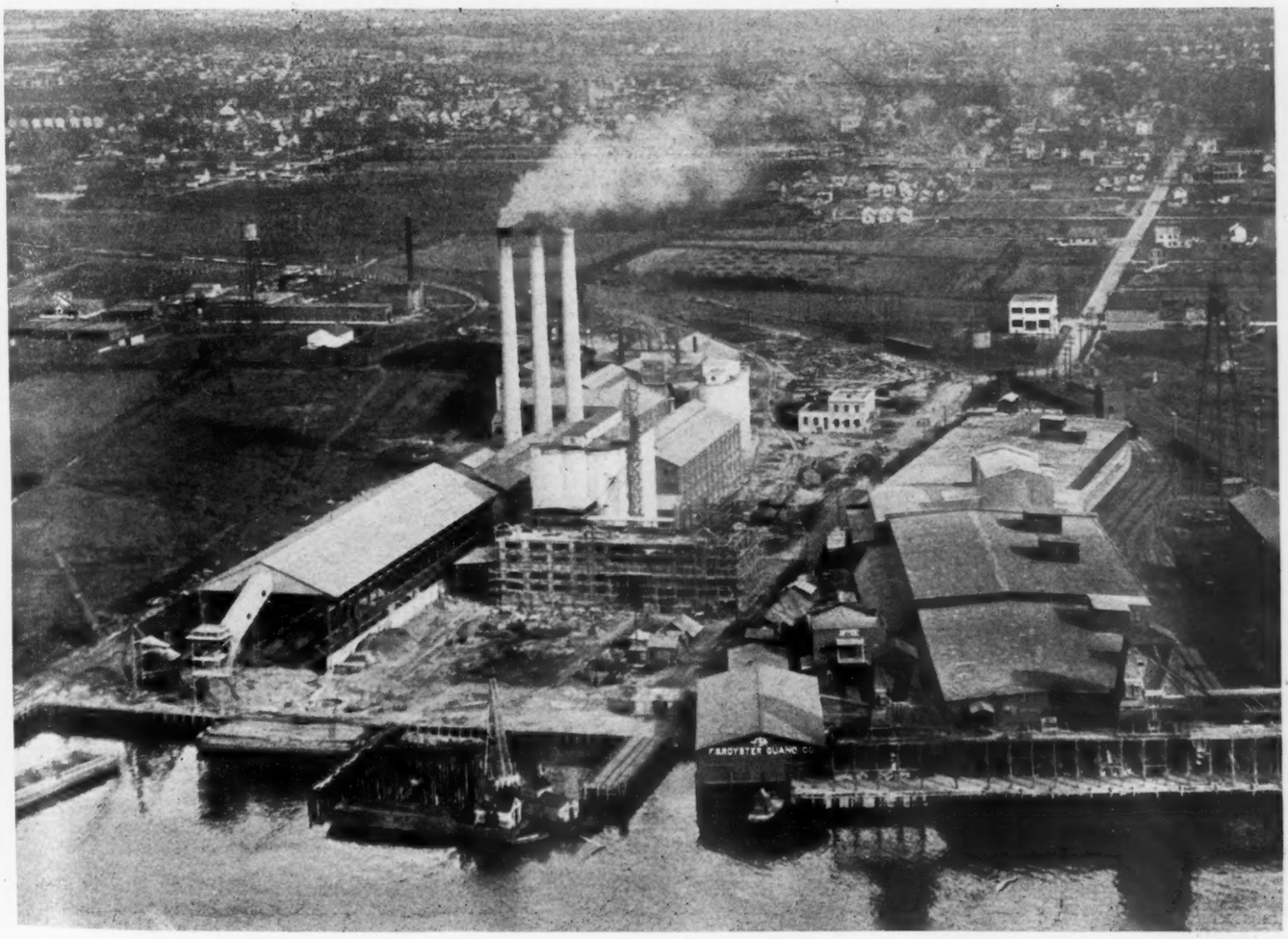
Virginia Portland Cement Corporation's New Plant

International Cement Corporations' Tenth Plant at Norfolk, Va., Uses Marl and Clay as Raw Materials—Ingenious System of Washing Marl

By Charles A. Breskin



Courtesy of "Ledger-Dispatch," Norfolk, Va.

Aeroplane view of Virginia Portland Cement Corp., taken while plant was still under construction

Panoramic view of the Virginia Portland Cement Corp.'

AN announcement that the International Cement Corporation has completed another new cement plant inevitably means that the industry has something to examine with interest; it generally means advancements in manufacturing technique, the latest and most modern equipment available, a mill that is kept scrupulously clean, a success where perhaps others have failed.

The latest International plant is that of the Virgina Portland Cement Corporation, Norfolk, Va. It is perhaps the most interesting development in cement manufacture since 1916 when International perfected a successful method for making high quality portland cement from oyster shells at its Houston, Texas, plant. All the years of experience gained in manufacturing cement at this and other plants was applied at the Norfolk plant, and the result is one of the most efficient cement plants in the world.

Early in 1924 experimental work began at Norfolk, Va. The details of previous attempts to make cement at this location were studied. Raw materials in the form of marl and clay were abundant. Norfolk was considered a strategic distributing point. The preliminary examination convinced International engineers that a cement of highest quality could be made at Norfolk and so the property was acquired. Then followed an exhaustive study of raw materials, perfecting methods of treating the raw materials and the designing of the plant proper. This took almost another year's time.

Actual construction was then started. Work was carried forward deliberately. The company had in mind thoroughness and quality of product as the first considerations, and not the desire to produce cement at the earliest possible date or to create a record for speed in construction. It took an entire year to build the plant, the first kiln being put in operation late in 1925.

Electric dragline, with 143-ft. boom, 4-yd. bucket, used to excavate marl

Thus a problem which had baffled other cement men for fifteen years was solved.

Marl Deposit

The lime content for the cement is obtained from marl deposits located at Chuckatuck, Va., on the Nansemond river, a navigable stream, about 25 miles above the plant. The marl deposit, some 2,000 acres in extent, consists primarily of shells, which were laid down thousands of years ago. The marl is of excellent quality and high in lime content, but intermingled with it are deleterious foreign substances and solving the problem of separating this foreign material from the marl really paved the way for the successful manufacture of a high quality cement.

The excavating and transportation method and equipment consists of a Class 175 Bucyrus electric dragline with a 143-ft. boom and 4-cu. yd. bucket. From 3 to 8 ft. of overburden must be stripped before the marl is reached. The marl deposit has a depth of 20 to 50 ft. The marl is loaded in 12-cu. yd. air-operated, side-dump cars and hauled to the washing and classification plant, located about one mile from the present digging operations.

Washing Plant

The washing and classification of the marl requires five different steps.

The loaded cars of marl arrive at the washing plant on a tipple and are side-dumped into a steel hopper, underneath which is a pan conveyor feeding a type "SX10" Pennsylvania hammer mill, direct-driven by a 200-h.p. induction motor. The action of the mill is such that the marl is disintegrated, and the bulk of the foreign material adhering to the marl is loosened. The discharge from the hammer mill is delivered to a flat belt conveyor, 36 in. wide, 250 ft. centers, which carries the material to the top of the washing building. Here it discharges to two units of Dorr washers.

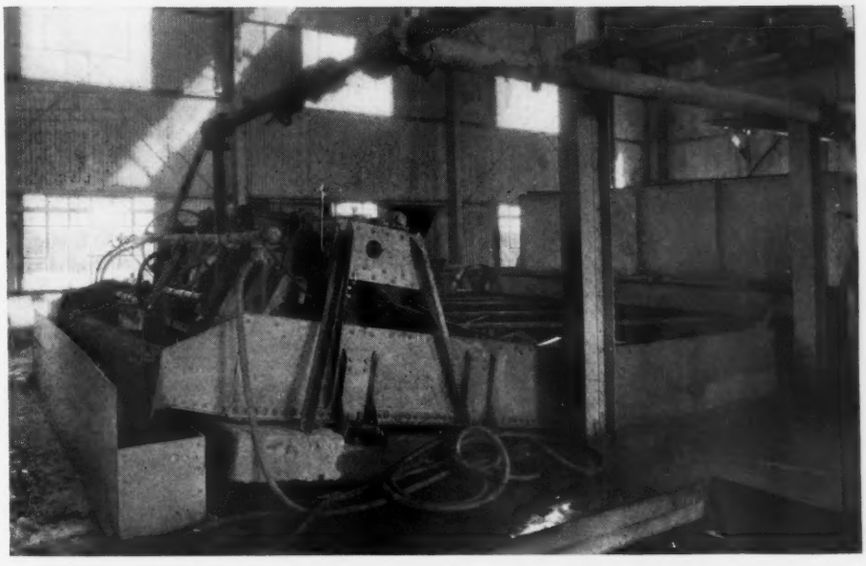
The function of the washers is to remove the clay, sand and other impurities (minus 48-mesh) from the marl, and thus raise the

rfolk, Va. The picture was taken during construction

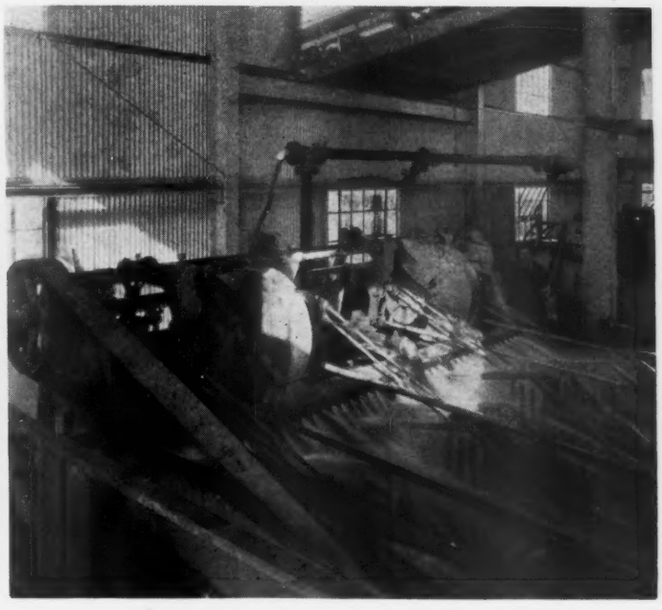
lime content to a point suitable for cement manufacture.

The washers consist of 5 ft. 6 in. x 14 ft. 6 in. trommels with ½-in. round perforations, mounted transversely across the lower end of a shallow sloping tank. The tank is fitted with quadraplex raking mechanisms, such as is used in Dorr classifiers. The feed enters through a hollow trunnion at one end of the trommel and passes through to discharge all material that will not pass ½-in. screens. The trommels revolve at 60 r.p.m., washing the marl in cascade fashion and discharge the oversize to hoppers feeding a belt conveyor.

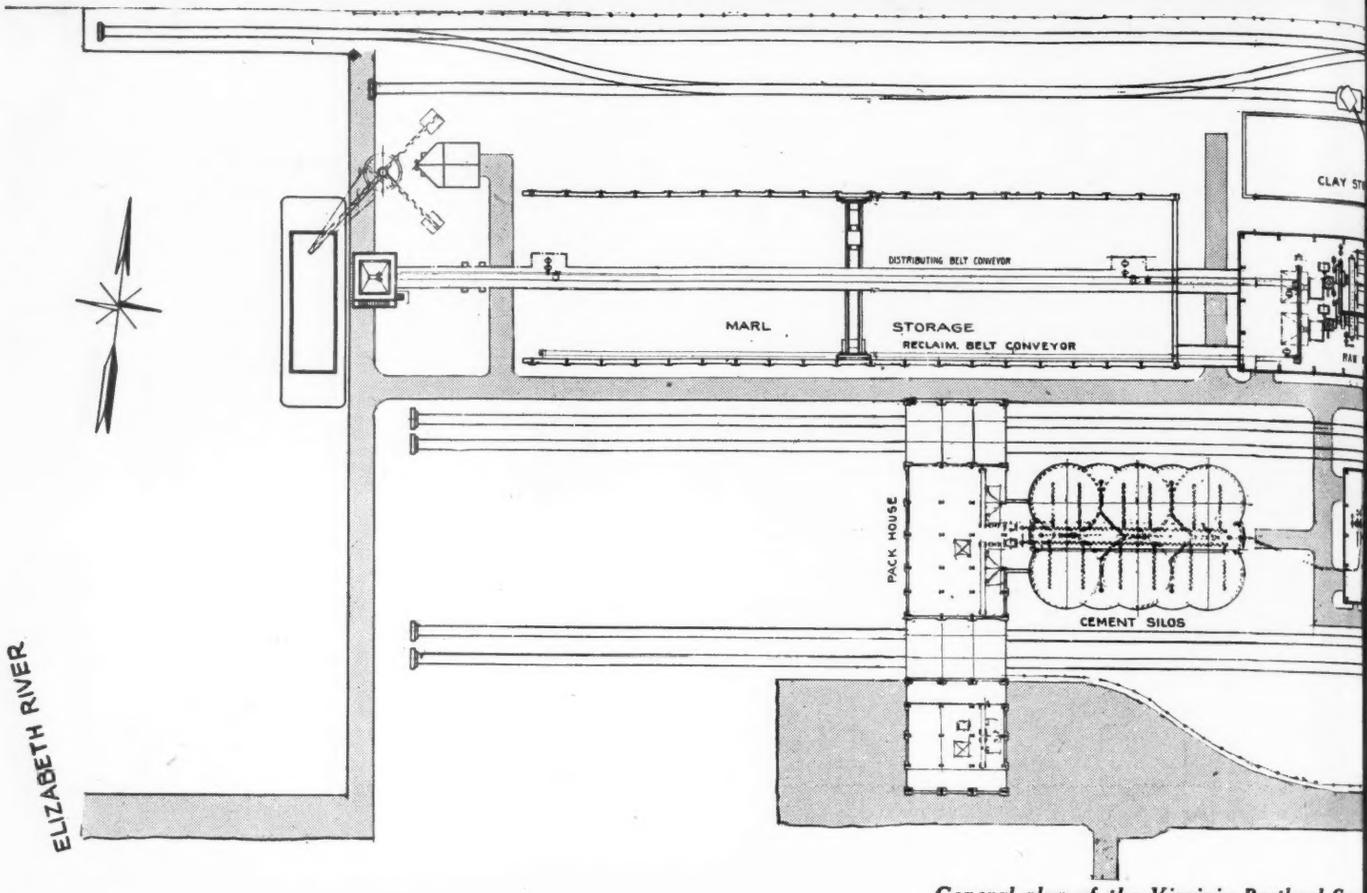
The undersize is screened through to the reciprocating rake compartment of the classifier. This machine has been so adjusted that the action of the rakes, combined with the flow of wash water which is applied further up the deck, throws the fine clay, silica and organic matter into suspension and is overflowed to waste through the lower end of the tank. The plus 48-mesh material, high-



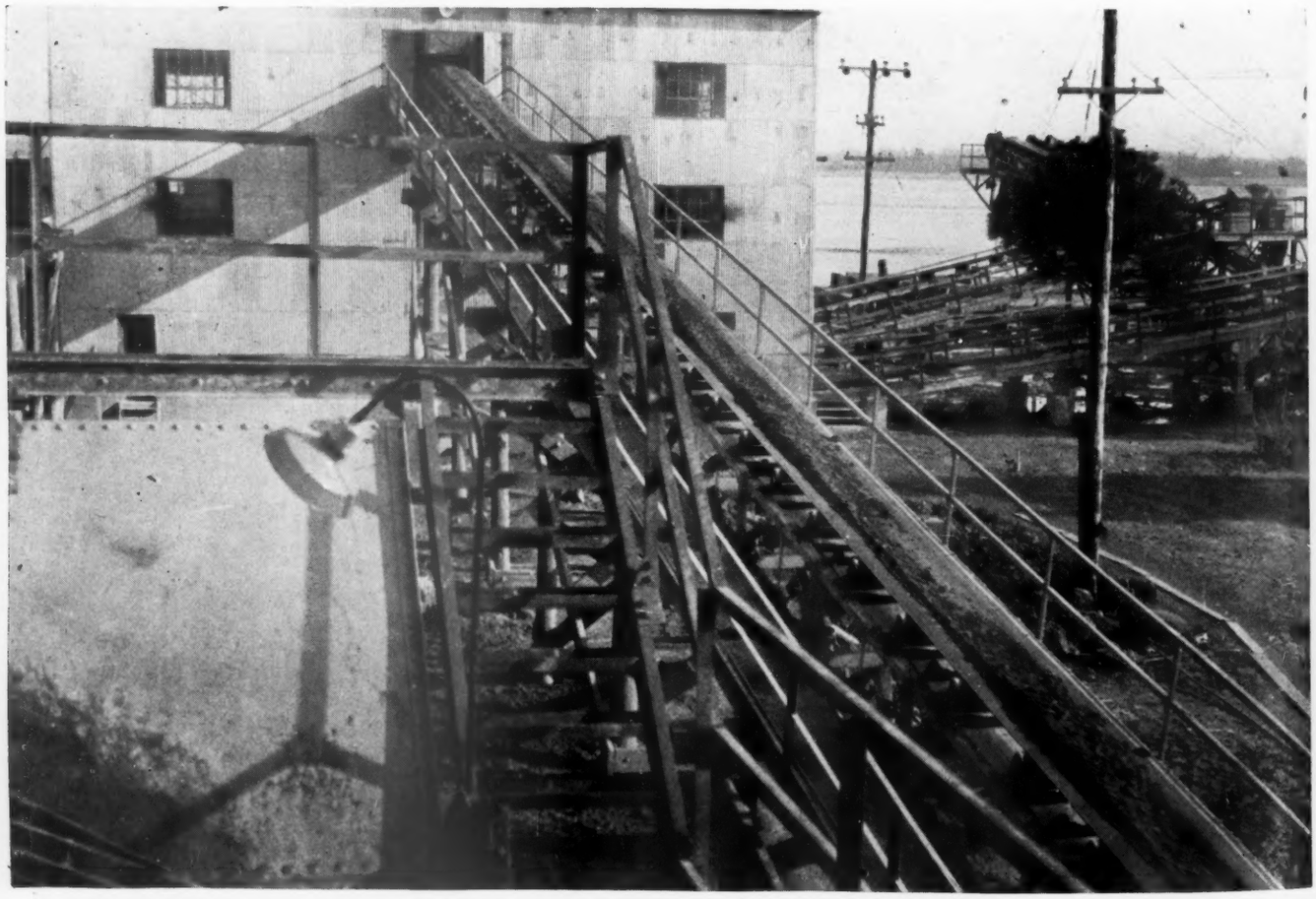
Discharge end of classifier. A belt conveyor is located underneath the steel hopper. Foreign materials are removed by overflow into the waste at the opposite end



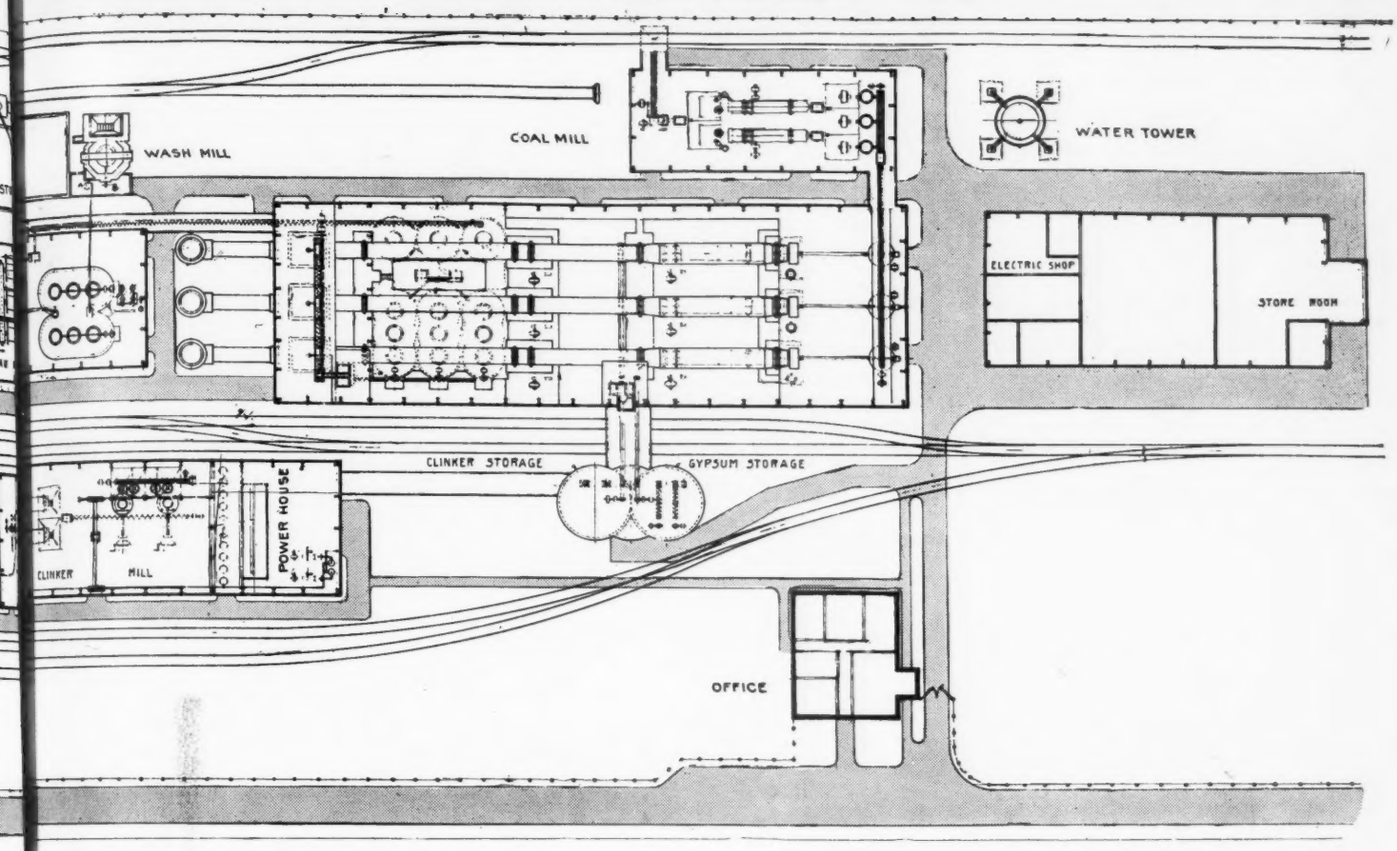
Left—One of two units of washers, showing trommel and classifier. Right—Quadruplex rakes convey the marl up the deck and at the discharge point it is thoroughly sprayed with fresh water



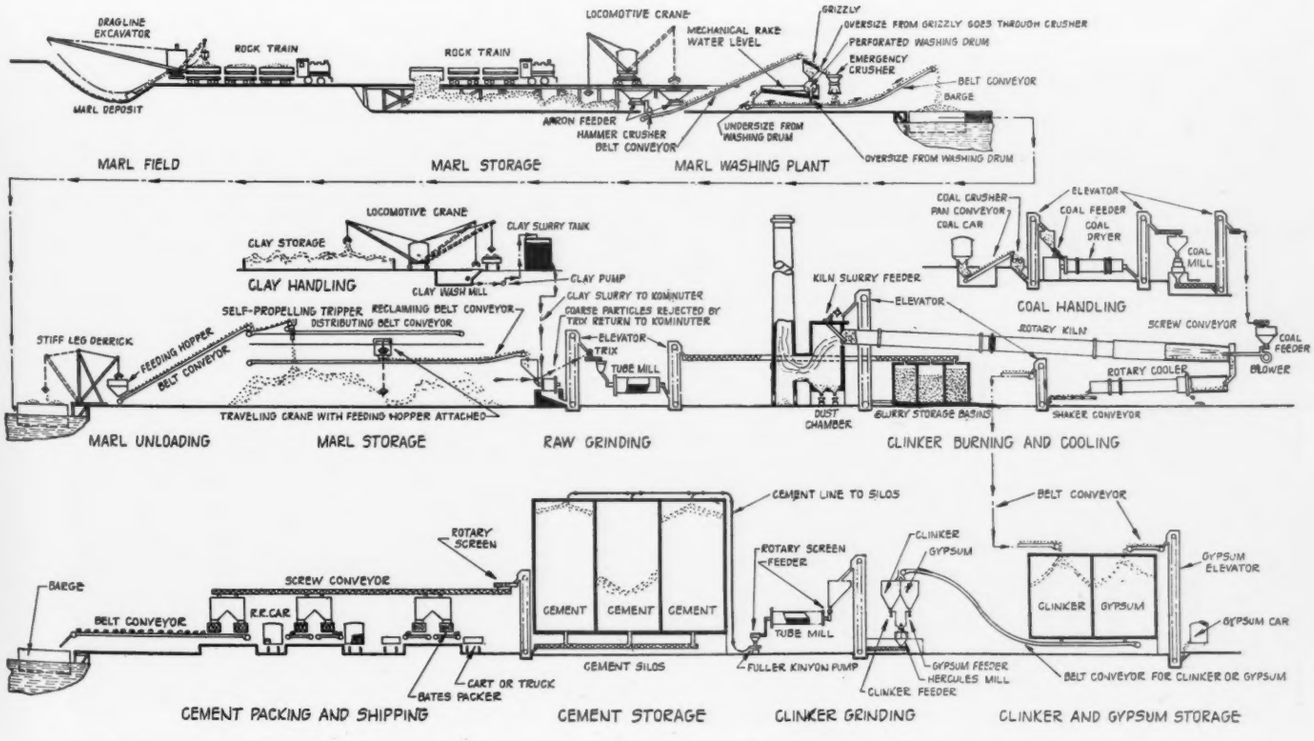
General plan of the Virginia Portland Cem



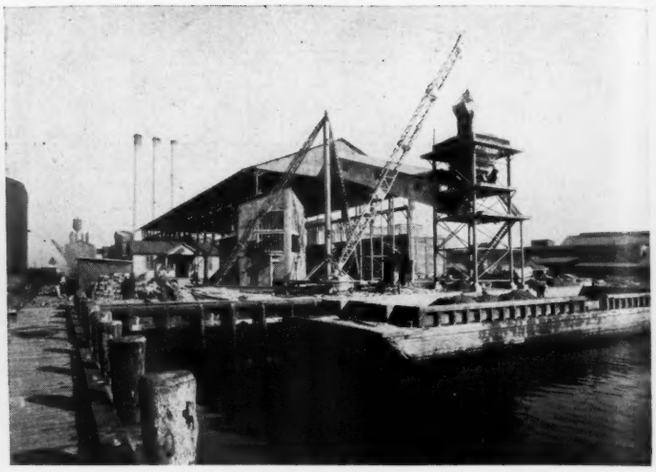
The marl treating plant and conveyor leading from hammer crusher to washing and classification machinery



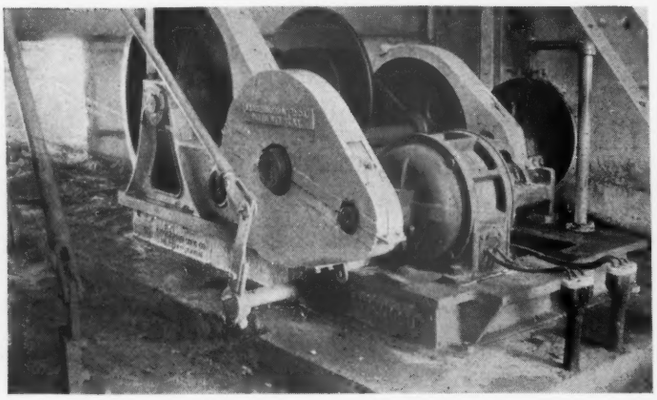
...'s new wet-process mill at Norfolk, Va.

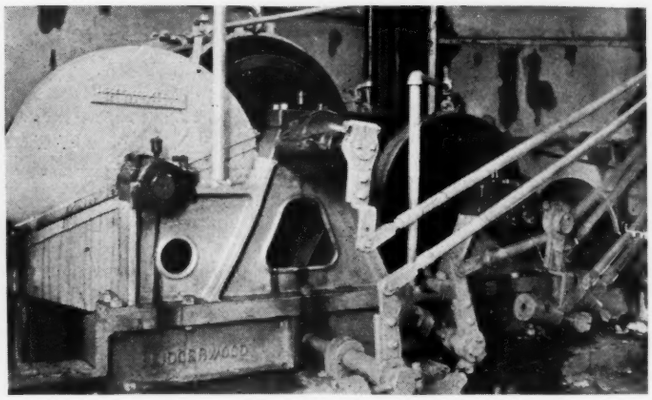


Flow sheet illustrating the process of manufacture at the new Norfolk plant of the Virginia Portland Cement Corp.



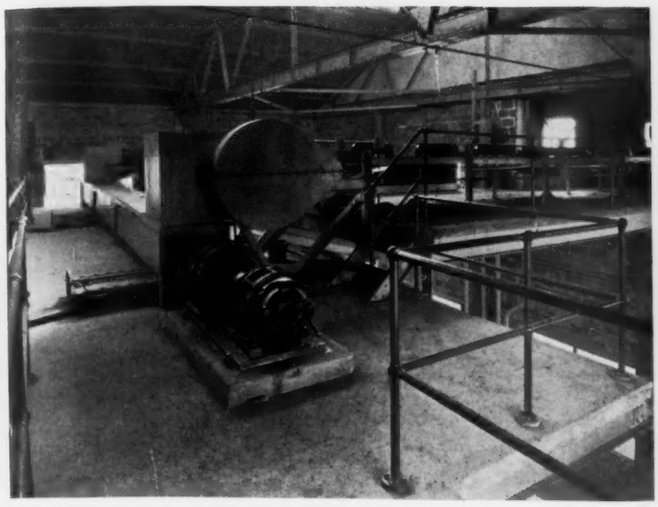
Left—Discharge from belt conveyor to barges. The tug tows three barges at a time to the cement plant. Right—Unloading marl from barges to conveyor which carries to marl storage or to raw grinding department

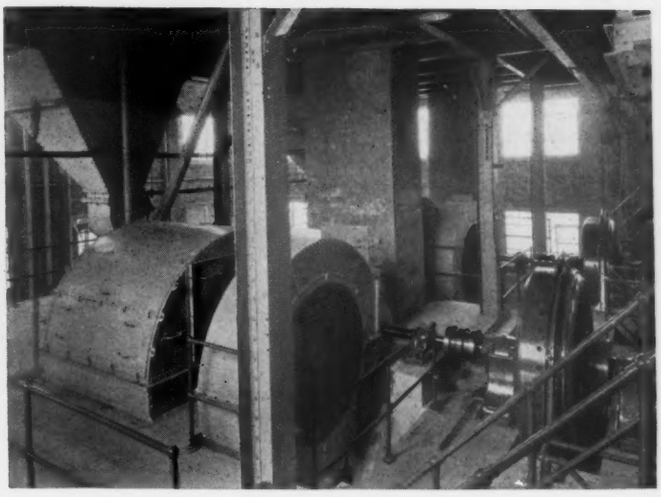




Left—15-h.p. hoist handling bull wheel of stiff-leg derrick. Right—100-h.p. hoist handling derrick operation. Note controls leading to operator on floor above

Left—Marl storage has a capacity of 30,000 tons. Distributing belt conveyor is located in truss work in center, reclaiming conveyor on left side. Note permanent hopper attachment on traveling crane. Right—The clay washer and storage is adjacent to raw grinding department. A locomotive crane unloads from cars into storage or direct to washer





Left—Distributing belt conveyor in marl storage discharging into screw conveyor feeding kominuter bins; reclaiming conveyor is in background. Right—Wet grinding kominuters direct connected to 125-h.p. super-synchronous motor. Reclaiming elevator is on right-hand side of each kominuter

lime-content marl, is conveyed up the deck by the rakes and after being thoroughly sprayed by wash water, is discharged in a clean, dewatered condition into hoppers feeding another belt conveyor.

Average operating results are as follows:

	Feed	Rake Discharge
$CaCO_3$	74.0%	88-91%
SiO_2	16.5%	7 to 8%
Fe_2O_3	3.4%	2 to 3%
Clay, etc.	Balance	0

All but about 10% of the total tonnage passes through the trommel screen and averages around 85% $CaCO_3$. The rake speed is 36 strokes per minute, and 1000 g.p.m. of wash water is supplied for each machine. Each unit of trommel and classifier is driven by a 40-h.p. motor.

The reclaiming belt conveyors are 30 in. wide, 100 ft. centers, and discharge to a transverse conveyor, 30 in. wide, 80 ft. centers. The last conveyor is mounted on a cantilever bridge adjusted so as to load barges to full capacity. All belt conveyors are driven by 15-h.p. motors through silent-chain drives.

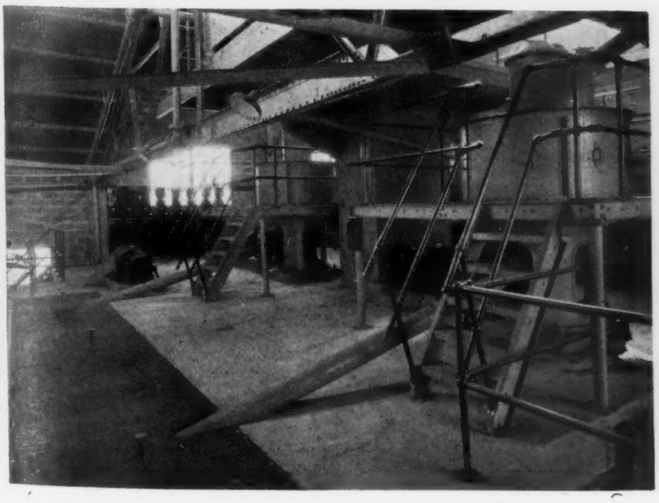
The barges are spotted directly underneath the loading conveyor and filled to capacity, about 350 yd. When three barges are filled, a tug tows them to the plant at South Norfolk, which has dock facilities on the Elizabeth river. Altogether there are nine or more barges in service, three of which are being loaded, three unloaded and three in transit. The tug makes two trips a day and this is more than ample to adequately supply the requirements of the plant—1200 to 1500 tons per day.

Unloading and Storage of Marl at Cement Plant

The barges tied up at the cement plant dock are unloaded by a Lidgerwood stiff-leg steel derrick, with a 90-ft. boom and 2½-yd. Hayward clamshell bucket. The derrick is operated by a 100-h.p. hoist and a 15-h.p. hoist for the bull wheel. The operators' platform with hoist controls is elevated and in a separate building, thus affording a clear view of the unloading operations at all times.

The clamshell bucket feeds a hopper, fitted with an apron conveyor, which distributes the material evenly on a 30-in. belt conveyor, running on an incline of 20 deg. to the top of the storage building. Here the marl is discharged to the distributing conveyor, which is located in the center of the storage building. This conveyor is 30-in. wide, 260 ft. centers, with scrapers every 16 ft., which can be put down or lifted at will. Thus, it is possible to deposit the marl through the entire storage building which is 304 ft. long, 80 ft. wide, with a total storage capacity of 30,000 tons of marl.

Spanning the entire length of the marl storage building is a Milwaukee overhead electric traveling crane fitted with a 2½-yd. Hayward clamshell bucket. Fitted to one end of this crane is an unloading hopper, with an apron feeder underneath. This arrangement permits an even load to be dis-



Left—Trix separators send fines to tube mill and return coarse to kominuters. Each Trix is driven by a 15-h.p. motor, through spur gear speed reducer. Right—Raw grinding tube mills, each direct driven by a 500-h.p. super-synchronous motor. Note that the driving gears of the mills are totally enclosed

tributed on the reclaiming conveyor located on the south side of the storage. As the crane travels, the hopper travels with it. The reclaiming belt conveyor is flat, 30 in. wide and 320 ft. centers. The discharge end is on an incline so as to bring the material to the top of the kominuter bins.

The distributing conveyor in the center of the storage is so arranged that it, too, can discharge directly to a screw conveyor, which distributes to the kominuter bins.

The storage building is entirely of steel construction with concrete retaining walls.

Preparation of Clay

Clay is received by rail from Waverly, Va., 60 miles from the plant. The equipment there consists of a dragline excavator which loads direct into gondola cars. The cars are brought into the plant, at the clay storage, located adjacent to the raw-mill department. A Link-Belt electric locomotive crane fitted with a 1½-yd. Hayward clamshell bucket unloads the clay from cars to storage, or from storage to the wash-mill hopper. The clay storage is open, 130x40 ft., surrounded by concrete retaining walls, and will store about 3500 tons of clay.

The wash mill is the F. L. Smidth & Co. standard type, driven by a 30-h.p. motor. As the clay is reduced to a fluid mixture, it is pumped out of the wash mill by a 4-in. centrifugal pump to the clay storage tanks. The clay tanks are of concrete, 20x40 ft., triple type, two units. Agitation is entirely mechanical at this point. The clay storage basins have a combined capacity of 2000 bbl. (finished cement). The clay is pumped out of the basins by a 4-in. centrifugal pump and delivered to the clay feeder trough located on top of the "Trix" separators in the raw mill. An additional 4-in. centrifugal pump is provided as a spare unit.

Clay tanks are shown in the background. Elevator in foreground, left-hand side, discharges to screw conveyor which carries slurry to correcting basins

Raw Grinding

The raw grinding department consists of two No. 85 wet kominuters, each served by a bin of 450 bbl. capacity. Discharge from

Kilns and coolers from the firing floor. The kilns are 9x8x220 ft., with four tire supports

the bins to the kominuters is effected through cradle feeders. At this point clay and water are also admitted, the clay being fed from the trough by two ferris-wheel type feeders, driven by variable-speed motors through worm gear reducers. The kominuters are driven by 125-h.p. super-synchronous motors.

The discharge from each kominuter is reclaimed by an elevator which carries and discharges the slurry to two No. 15 Trix separators, each driven by a 15-h.p. motor through a spur-gear reducer. The separators return coarse material to the kominuters, while the fines are carried to the tube-mill feed trough for finish raw grinding.

There are three No. 20 (7x24-ft.) Smidth tube mills, each driven by a 500-h.p. super-synchronous motor. A point of special interest is that the driving gear of the tube mills is totally enclosed, and that each has a periphial discharge. The slurry is then collected in a flume, carried to an elevator and a 16-in. screw conveyor 220 ft. long, running overhead in a concrete trough and discharging to either of three correcting basins, through valves or gates.

Chemical Control by "Wet-Blending"

There are three correcting basins 22 ft. high, 20 ft. diameters, with a combined capacity of 1500 bbl. At this point the chemist analyzes the contents of each tank, and inasmuch as there is exceptional storage capacity complete chemical control is possible. There are two elevators at his disposal and with these he can draw from any of the correction basins to storage basins or withdraw from the storage basins to any other storage basin or correcting basin. This system the manufacturer has termed the "International wet-blending process."

The company is a thorough believer in the fact that the quality of cement is absolutely dependent upon uniformity of the slurry entering the kiln. The chemist must get the exact chemical proportions, and that he does is shown by the fact that the slurry never varies more than 1/10 to 2/10% on entering the kiln. This method of control of chemical content has enabled the company to manufacture a portland cement exceeding standard specifications by a considerable margin.

Kilns from feed end showing slurry basins underneath. Each kiln is driven by a 50-h.p. motor through silent-chain drive

The slurry basins are of the triple type, 20 ft. diameter, 40 ft. long, 22 ft. high. There are three units, located underneath the kilns, with a combined capacity of 4500 bbl. Both in correcting basins and slurry basins, mechanical and air agitation is used.

Kiln Feeds and Kilns

Slurry for kiln feed is withdrawn from the basins by screw conveyors underneath the tanks and fed to two elevators which carry it to the kiln feed trough. Ferris-wheel feeders driven by variable speed motors through worm-gear reducers, discharge the slurry to the kilns. The speed of the slurry feeders is regulated by the burner on the kiln floor.

There are three kilns, 9x8x220 ft. The 9 ft. diameter extends for 65 ft. in the burning zone. The kilns are lined with 9-in., 6-in., and 4-in. firebrick, "Kruzite" being used in the hot zone. Each kiln has four tires and is driven by a 50-h.p. variable-speed motor through a silent-chain drive.

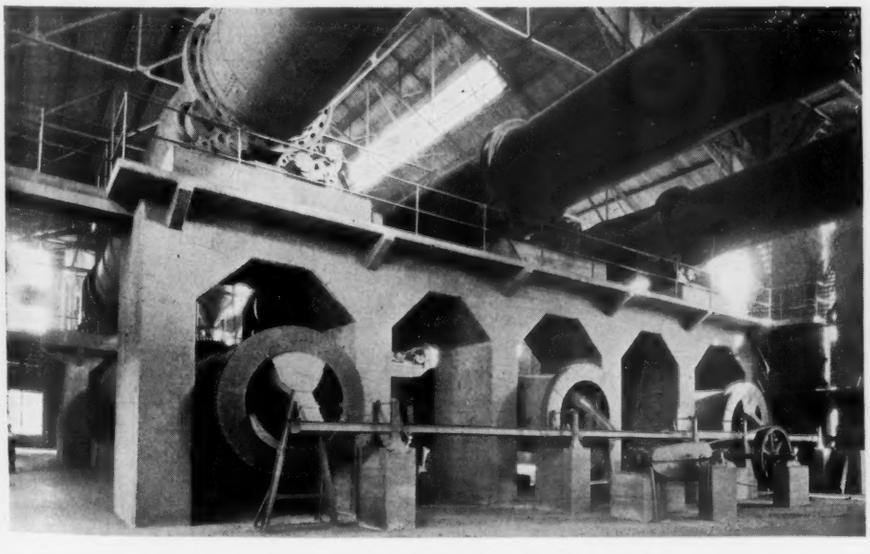
Coolers and Clinker and Gypsum Handling

Each kiln discharges to a cooler 7x7½x75 ft., the 7½-ft. section being the hot zone which is lined with 6-in. firebrick. The remainder is cast-iron lining. Each cooler is driven by a 25-h.p. motor through a silent-chain drive. The coolers are all fitted with central discharge devices, which made possible a saving of 8 ft. in height.

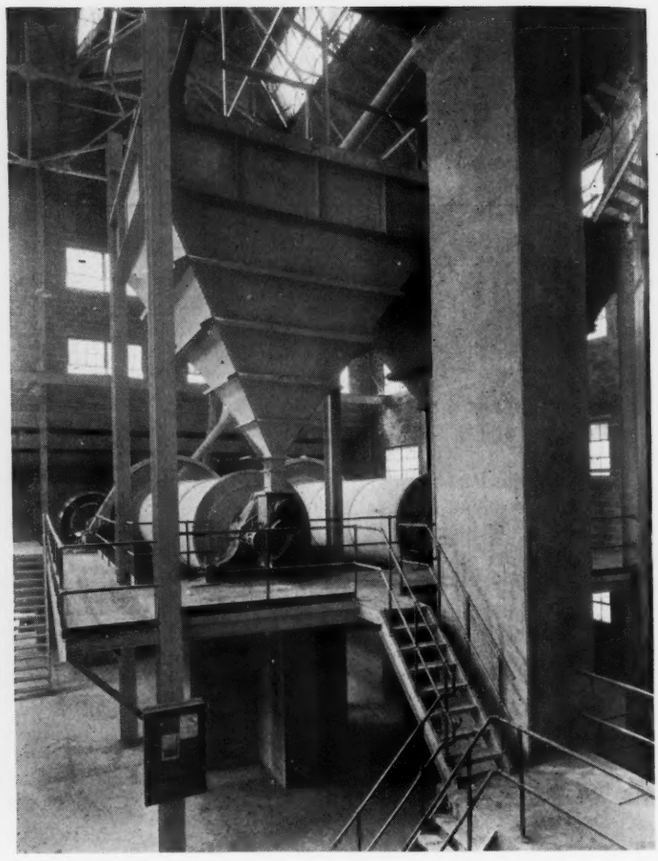
All three coolers discharge to one "shaker" conveyor located at right angles to the coolers. The shaker conveyor consists of a steel trough, suspended by pendulums, actuated by a flywheel and eccentric into an intermittent forward push and a backward motion. The clinker is rapidly and constantly carried forward to the point of discharge, where two elevators are located. One of these elevators is for clinker and the other for receiving incoming gypsum. The elevators were placed adjacent to each other so that either one could serve for clinker, in case the other should break down. This is possible since the gypsum elevator is in use only 5% of the time.

Both elevators discharge to a short belt conveyor, which, in turn, discharges clinker to one silo and gypsum to another. The silos are 33 ft. in diameter and 50 ft. high, with a storage capacity of 12,500 bbl. of clinker and 9500 bbl. of gypsum.

A 24-in. troughed belt conveyor runs un-



The coolers are 7x7½x75 ft. and are equipped with central discharge devices which discharge clinker to shaking conveyor. The conveyor discharges at the right to pair of elevators handling both clnker and gypsum

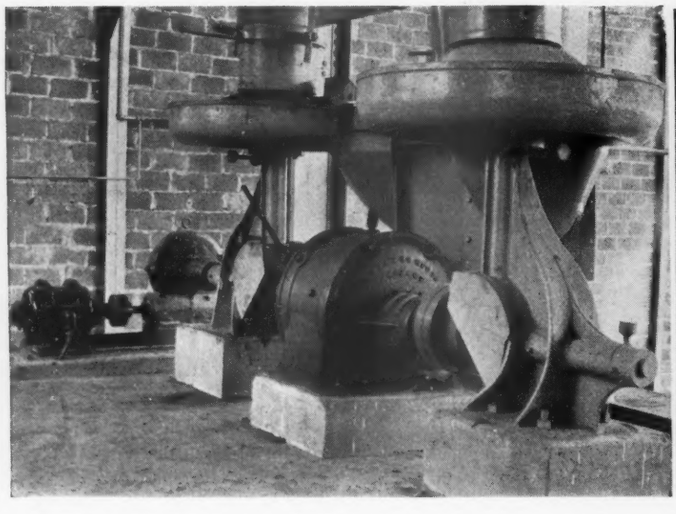


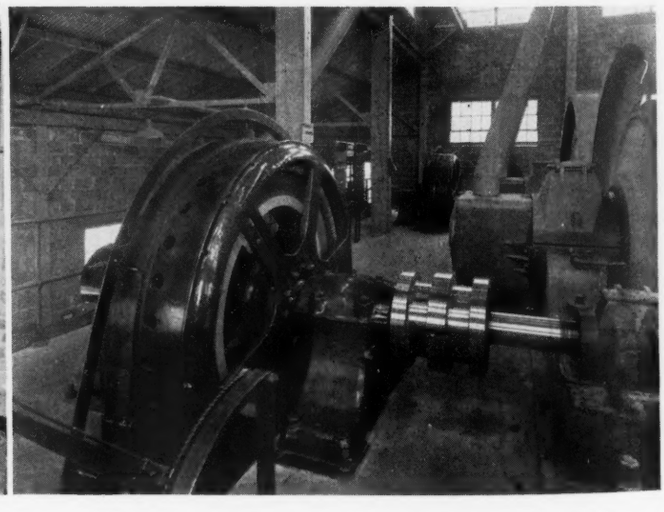
Left—Preliminary clinker grinding mills, each driven by a 300-h.p. super-synchronous motor. Note connections to cyclone dust collector and general cleanliness prevailing throughout. Right—Finish grinding tube mills from feed end. Elevator in foreground is from preliminary grinders. Usual cleanliness and neatness prevails

derneath the silos carrying clinker or gypsum to the finishing department. When the finish mill is started in the morning, the conveyor operates from 15 to 20 minutes on gypsum alone, and in this short time enough is secured for the day's operations.

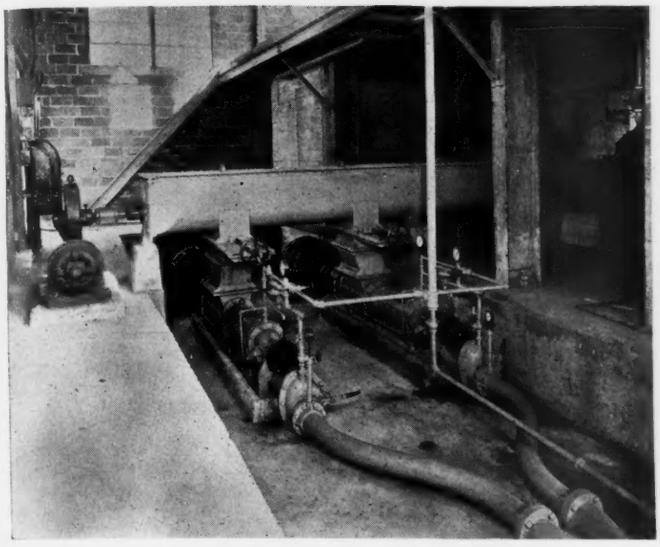
Finish Grinding

The preliminary grinding in the finish department is done by two Bradley "Hercules" mills, each direct driven by a 300-h.p. super-synchronous motor. Above each mill are two hoppered bins, one for clinker and one for gypsum. To get the proper proportion of each to the Hercules mill the company has developed an ingenious type of table feeder. This is located directly underneath the clinker and gypsum bins. The feeders are hooked up in tandem, running from one motor, with one reduction in speed (for gypsum) obtained by a worm gear reducer, and the other (clinker) by a spur gear reducer placed between the two feeders. With this arrangement it is possible to get extreme accuracy in proportioning feed to the preliminary grinders. A cyclone dust-collecting system is installed in connection with the





Left—Table feeders and clinker and gypsum proportioners for preliminary grinding mills. Note arrangement of drive. Right—500-h.p. super-synchronous motors driving finish tube mills. Each motor has its own mill panel and signal board, controlled from main switchboard at powerhouse. The pipes leading from discharge end of tube mills are connected with cyclone dust collectors



Pumps which convey finished cement to silo storage. One unit is for "standby" purposes only

preliminary grinders.

The discharge from the Hercules mills is taken by screw conveyors and elevators and deposited in two bins, each 500 bbl. capacity, feeding two Traylor 7x26-ft. steel lined tube mills. Each tube mill is direct driven by a 500-h.p. super-synchronous motor. The tube mills are also connected to cyclone dust-collecting systems.

Cleanliness Saves Men

The photographs of the machinery reproduced here were taken while the mills were in operation. The prevailing neatness, order, and cleanliness of the plant has had a salutary effect on the men, who invariably take a greater interest in the machinery entrusted to their care. This policy of "good housekeeping" is carried out throughout the entire mill. It keeps the men satisfied and that's no little factor in turning out a quality product.

The discharge from the tube mills goes to a screw conveyor which delivers the cement to a Fuller-Kinyon pump. This unit, pumping through a 6-in. pipe line, delivers the finished cement to storage. An additional Fuller-Kinyon pump is provided as a standby unit.

Coal Handling

Coal is received in gondola cars and is unloaded by a locomotive crane into an open storage of 1500 tons capacity and located outside and adjacent to the marl storage building. Generally, however, the loaded cars of coal are spotted at the unloading hopper at the coal mill and discharged, thus eliminating the necessity of conveying the coal by car from storage to hopper. When the latter is necessary two hopper bottom cars are used, a Mead-Morrison car puller being utilized for spotting.

Underneath the track hopper is a pan conveyor feeding a 30-in. Jeffery coal crusher. The crushed coal is delivered to an elevator, which carries it to the top of the coal-mill building and discharges to two bins head of the McGann coal dryers.

The dryers are 6x 45 ft., of the double-shell type, each driven by a 15-h.p. motor through a spur-gear speed reducer. The discharge from each dryer is passed over standard type magnetic separators in order to remove any tramp iron, and an elevator then carries the dried coal to the bins feeding the coal pulverizers.

There are three Fuller-Lehigh coal pulverizers, each gear driven, direct, by a 100-h.p. induction motor. The coal, after being ground to the desired fineness is discharged to a screw conveyor and then by another elevator and screw conveyor it is conveyed to the kiln-feed bins. Fuller-Lehigh coal feeders and Buffalo fans, each driven by a 25-h.p. motor, blow the pulverized coal into the kilns.

In keeping with the other departments, dust in the coal mill is kept down to a point where it is practically negligible. This is accomplished by cyclone dust collectors and air washers, designed and built by the company's engineers. Water used in the washers, with its contained coal dust, is returned to raw grinding department for use in raw mix. The air washers are very efficient and in addition to keeping dust down in the coal mill, they also prevent the buildings from getting dirty.

The kiln hoods are of a special type designed by International engineers. They have hot-air channels which utilize a certain amount of hot air taken from the coolers. The device acts like an injector created by the fan blowing the coal in. The hot air channel is so designed that the preheated air surrounds the flame.

Each kiln has an individual stack 200 ft. in height, 9 ft. diameter at the top. These were constructed by the Rust Engineering Co. Between each kiln and stack is a concrete dust-collecting chamber, 16 ft. square, 45 ft. high. This chamber is lined with "Silo-Cel" and 9-in. firebrick. The insulation was provided to protect the concrete from undue expansion and contraction. Dust is removed by means of operating gates.

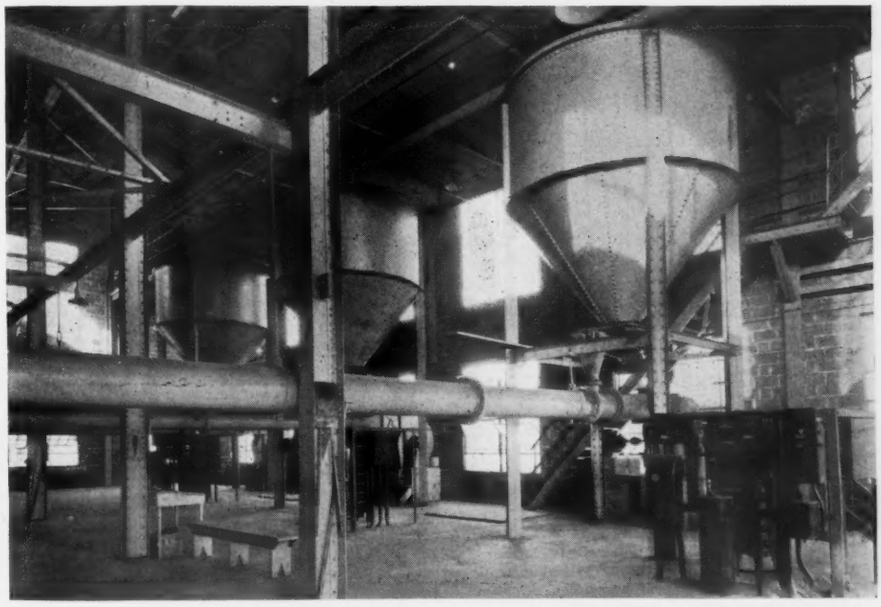
Storage and Packing

The finished cement stock house consists of six silos, 32 ft. in diameter by 80 ft. high, and with interspace and pockets, the total capacity is approximately 110,000 bbl.

Cement is drawn out of the silos by a system of screw conveyors and elevators and delivered to the packhouse bins underneath which is located a battery of four 3-spout Bates valve-bag packers. This is packhouse No. 1 and is for railroad car loading.

Across the tracks and to the south of the main packhouse is a smaller packhouse with two 3-spout Bates packers. This unit is utilized for truck loading. It is connected to the main packhouse by a bridge.

Both packhouses are modern in every respect, containing suitable storage for cloth and paper sacks, mending units, picking belts and a bag cleaner. Four Sly dust collectors



Pulverized coal bins, feeders and blowers, which convey coal to kilns. Note controls for kiln operation

are used, two being in the main packhouse, one in the truck-loading packhouse and one on the bag cleaner. Freight elevators are used to carry empty bags, etc., to the second floor of the packhouses.

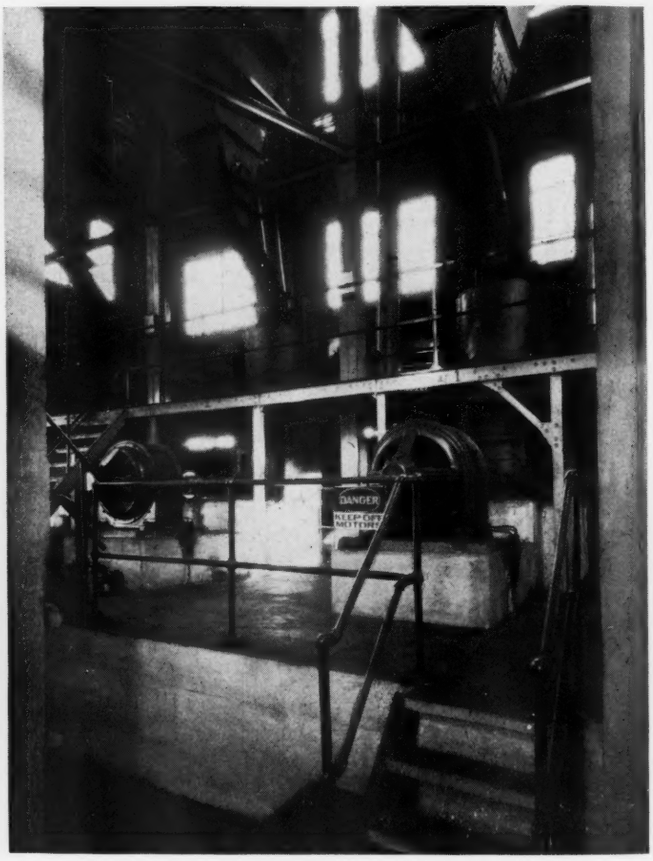
At the time of the writer's visit, a conveyor was being installed from the main packhouse to the dock for boat loading. The conveyor will be mounted on a bridge which can be raised or lowered to the boat according to the tide. The entire system is designed for mechanical handling throughout. Silos and packhouses were built by the MacDonald Engineering Co.

General Construction

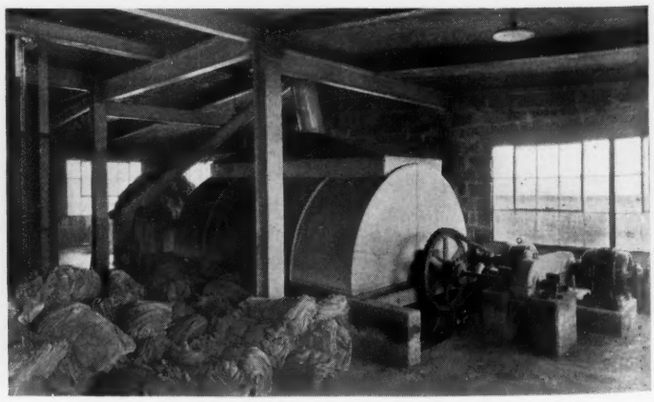
The property being on the waterfront it was necessary to drive piles for every structure of any consequence. About 5000 piles were driven. Steel and concrete construction was used throughout. The walls of the buildings are of cinder-concrete hollow tile, 6x8x16-in., plastered outside in attractive manner. Steel sash and wire glass is used throughout. Plenty of window space was provided for and great attention paid to ventilation. The general appearance is extremely neat and pleasing.

In addition to the general mill buildings, there is a very complete machine shop and store room. This building is 70x188 ft. and contains the electrical repair, carpenter and machine shops, as well as store rooms. Above this is the washroom containing steel lockers, shower baths, and toilet facilities consisting of the most modern type of industrial plumbing and sanitary equipment. A separate section is provided for colored employees.

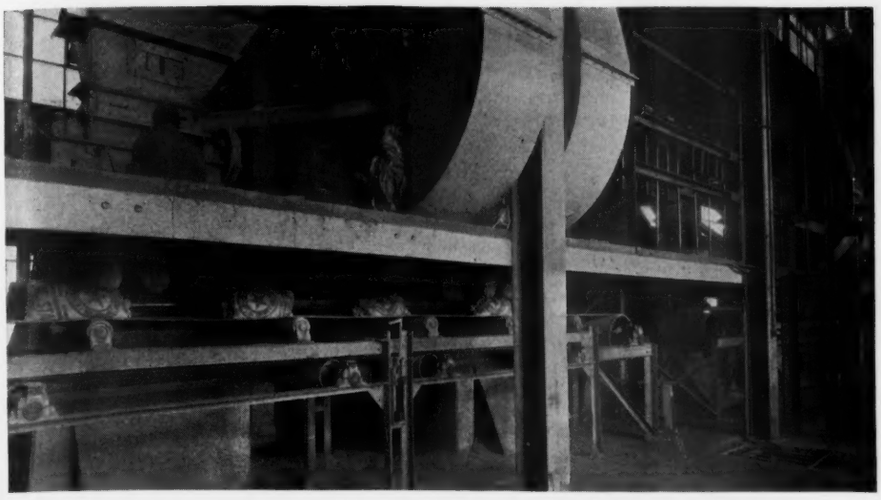
The office is a two-story structure of attractive appearance. On the first floor is the general superintendent's office, clerk's office, and the chemical laboratories. On the



Left—One of the 6x45-ft. double-shell coal dryers. The discharge is passed over a magnetic separator to remove tramp iron. Right—The coal pulverizers are gear-driven, being direct connected to 100-h.p. motors. Stack leadng from feed end are connected with cyclones and air washers



Left—Second floor of packhouse showing sack storage. Note how orderly the arrangement is and how well illuminated the building is. Right—Bag cleaner is of the company's own design. It is connected to a dust collector



Main packing department. The conveyor carries cement direct to cars for railroad shipment. Empty bags are carried to second floor by freight elevators shown on right. The chutes in center deliver bags within reach of bagging machine operator

second floor is the drafting room and a general meeting room. Here, too, shower baths and modern toilet facilities are provided.

Laboratories

The chemical laboratory is modern in every respect. In addition to physical and chemical testing departments, there is a separate room where a motor-driven Tinius Olsen testing machine for crushing strength has been installed. In this same room is also the hand operated Olsen tensile strength machine. The chief chemist's office is very complete, containing a full store of necessary chemicals, as well as containing records of tests.

All the walks and driveways between the various buildings are paved. A main driveway extends from the south packhouse to the street, enabling trucks to go in and out with ease, being wide enough so that there will be no interference.

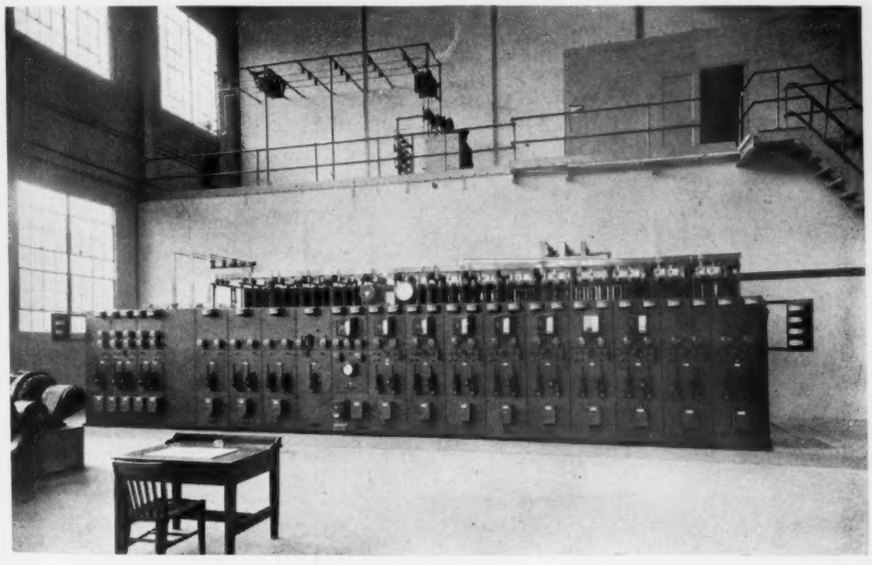
The yard system has sufficient trackage to enable the handling of coal cars, clay cars and empty and loaded cars of cement.

Electrical Layout

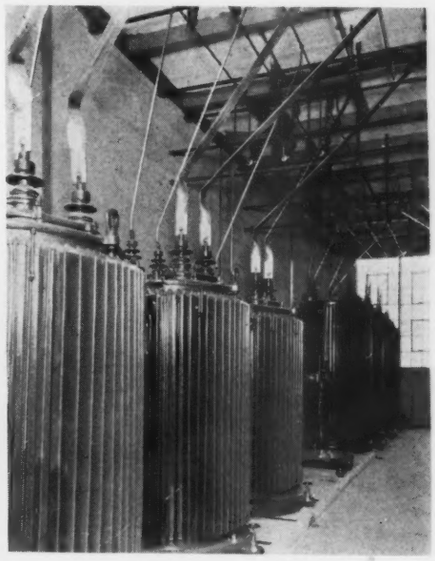
For the electrical layout of the plant the most recent features of cement-mill electrification have been adopted. Power is supplied by the Virginia Electric & Power Co., directly from an 11,000-volt bus of their nearby local Berkley sub-station through an underground cable to the main oil circuit breaker located on an elevated floor in the switchboard room. This cell-mounted switch has a motor-operated closing and tripping device and is electrically controlled by a push button station mounted on the totalizing panel. Two banks of transformers are placed directly underneath this switchboard in a separate transformer room. One bank consists of four units of 833 k.v.a. each, for obtaining 2300-volt power and the other of four units of 400 k.v.a. each, for obtaining 460-volt power.

All of the important switching equipment is placed in the switchboard room, which puts all of the power requirements of the entire mill under the control of one man—the switchboard operator. Only the small general purpose motors are handled by the mill attendants. This puts all of the electrical machinery under the control of skilled supervision at all times.

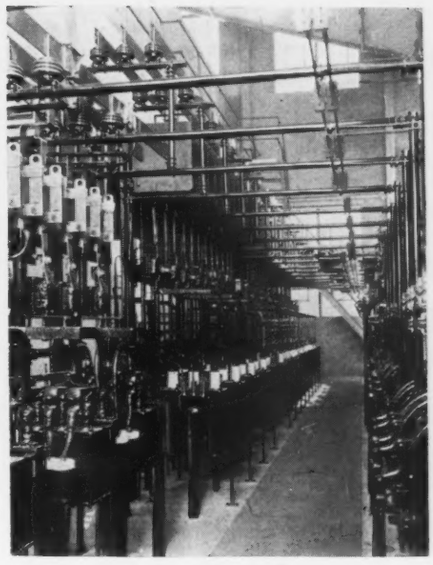
Meters and instruments are concentrated at one point—in the power house. The starting is done by the same man day in and day out. This eliminates the unauthorized starting of heavy units and maintains the electrical operation of the plant at the highest



Main a.c. switchboard in power house. All meters and instruments are concentrated here, and this puts entire power requirements of mill under centalized control, eliminating unauthorized starting of heavy units. A signal system is installed between switchboard and various panels throughout mill departments



Transformer room containing four 833 k.v.a. and four 400 k.v.a. transformers

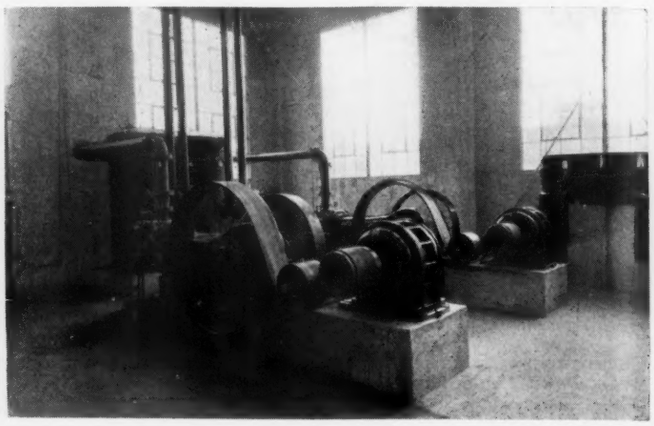


Back of switchboard, showing accessibility to wiring

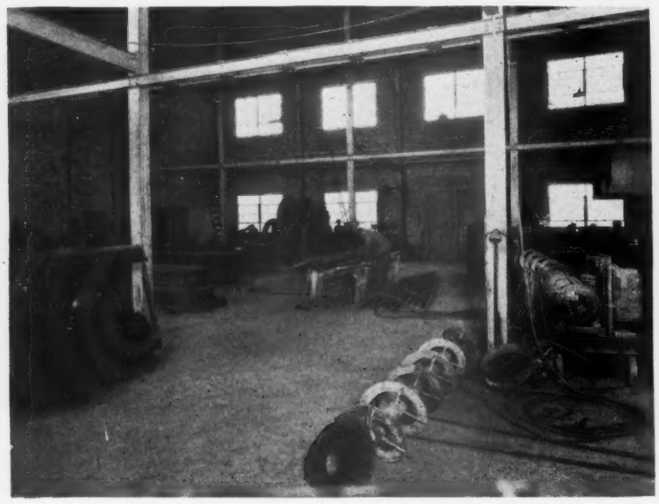
efficiency. To demonstrate this it may be mentioned that a 95% plant power factor is maintained at all times.

Two separate switchboards are installed in the power house, one main a.c. board and one auxiliary d.c., and lighting board. All metering for the station is taken from the high tension side of the transformers. Each of the independent switchboard panels is equipped with suitable instruments such as watt-hour meter, recording watt meter, ammeter, volt meter, power-factor indicator, transfer switch and over-current time limit relays.

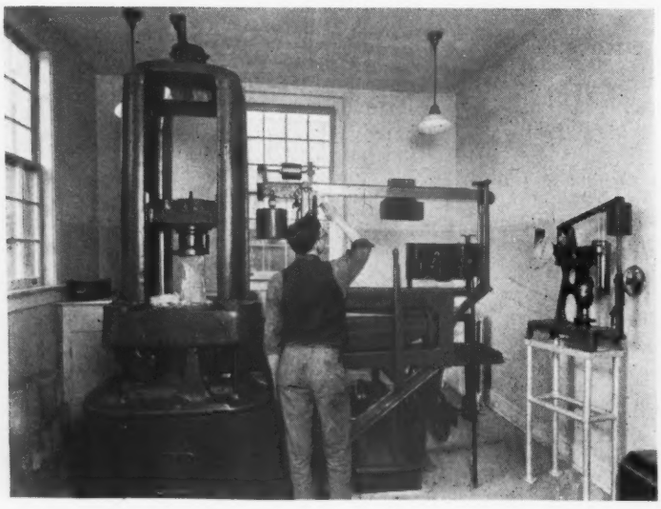
A 100-ampere storage battery is the source



Left—D.C. switchboard and lighting board. The two 90 k.w., d.c. motor generator sets furnish current for excitation of synchronous motors, and also supply power for magnetic pulleys. Right—Air compressors in power house furnish air for slurry agitation

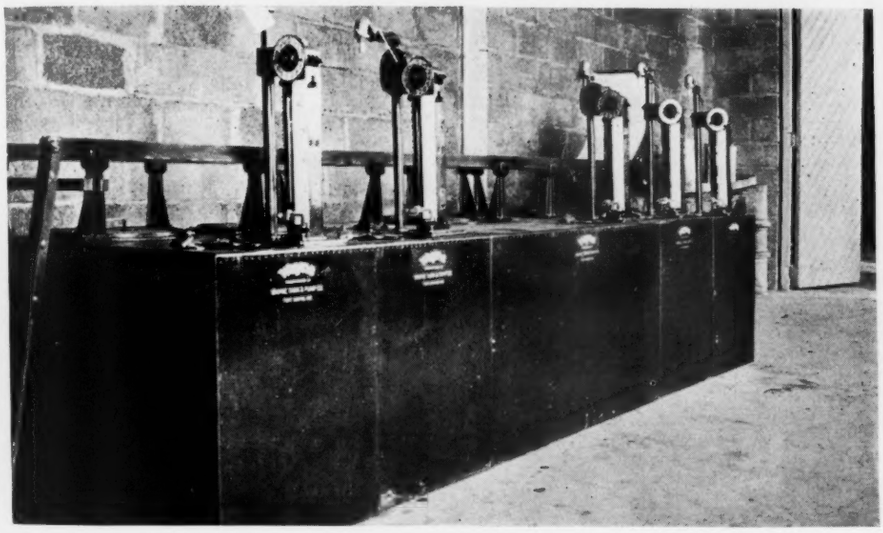


Left—Machine shop where repairs are made. Note welding operation. Right—A section of the storeroom. All supplies are kept on steel shelving. A 5-ton overhead hand operated crane spans machine shop and storeroom



Left—The testing machine for breaking strength. The cylinder in this photograph cracked at 80,000 lb. Right—Part of the well equipped chemical laboratory

Views taken in chemical laboratory. Every facility is provided for testing work of any nature



Oils, gas, kerosene, etc., are kept in tanks and an accurate record kept

of power for operating the main circuit breaker, the relays and the field signal system. It also furnishes power for emergency lighting in the power plant.

Located in the power house are two 2300-volt induction motor generator sets of 90 k.w.-d.c. They are used for the field excitation of the super-synchronous motors and also to supply power for small d.c. motors and magnetic pulleys for extracting tramp iron from the coal before it enters the Fuller mills. In another corner of the power house are two 12x10-in. Ingersoll-Rand air compressors.

"Safety First" was the slogan for the installation of the entire electrical equipment throughout the plant. From the power house to the various departments all feeder and control wires are lead covered and placed in vitrified clay ducts underground.

The starting and control apparatus in the mill are well protected — the wiring system placed in conduit pipes and imbedded in the concrete floors.

The lighting system is so complete that no dark or shady places can be found at night. The whole yard-lighting system is controlled from one switch in the switchboard room.

The entire electrical installation consists of 184 motors with a combined horse power of 6650; at least one-half of the total installed horse power is for emergency or stand-by units.

The plant office building. This houses general superintendent, chemical laboratory, drafting room, chief clerk, etc.

All the electrical apparatus in the plant, including super-synchronous motors, was furnished by the General Electric Co. All gear reducers, spur and worm, by the D. O. James Manufacturing Co. All conveyors have Hyatt roller bearings and Alemite lubrication, and are of the Mellin type, built by the Hydraulic Pressed Steel Co.; silent-chain drives by the Link-Belt Co., kilns and coolers by Reeves Bros. Co., firebrick by the A. P. Green Fire Brick Co., kiln stacks, Rust Engineering Co., all conveyor belting, B. F. Goodrich Rubber Co.

The writer was given the opportunity of looking over the records and found the following average analysis for a 28-day period:

CHEMICAL	Per Cent
SiO_2	22.10
R_2O_3	10.15
CaO	64.26
MgO	.87
SO_3	1.76
Loss	.78
Total	99.92

PHYSICAL TESTS OF CEMENT

	Setting Time		(200 Mesh)	Tensile Strength 1-3 Sands			
Boil	Initial	Final	Fineness	1 Day	3 Days	7 Days	28 Days
100%	3.05	5.50	87.8	190	310	385	490

It is obvious that standard specifications are exceeded by a considerable margin.

The plant has an annual capacity of 1,200,000 bbl. and the major portion of its production will find its market in the Carolinas, Virgina, Georgia, West Virginia, eastern Maryland and Delaware. Shipments, by water, have already been sent to Florida. The location is such that access is had to eight railway lines entering Norfolk. The 30-ft. channel in the Elizabeth river permits the loading of the large ocean going liners.

The president of the Virginia Portland Cement Co. is H. Struckmann; vice-presidents, H. C. Koch and E. Posselt; treasurer, H. H. Muehlke; assistant treasurer, Geo. E. Lewis; manager, H. E. Hilts; sales manager, C. E. Fontaine; superintendent, Geo. S. Winther; chief chemist, Harry A. Williams; electrical engineer, Carl Erdman.

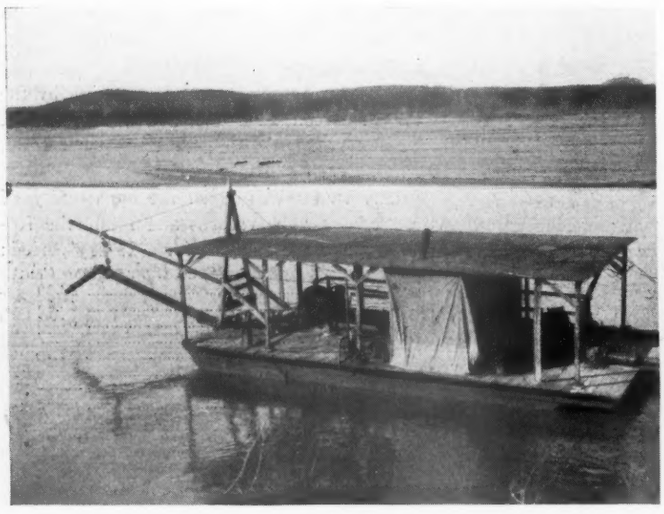
The Sand and Gravel Plants of Oklahoma and Kansas Affected by Big Merger

Producers Get Together for Economy and Efficiency of Production and Distribution

By Edmund Shaw
Editor, Rock Products

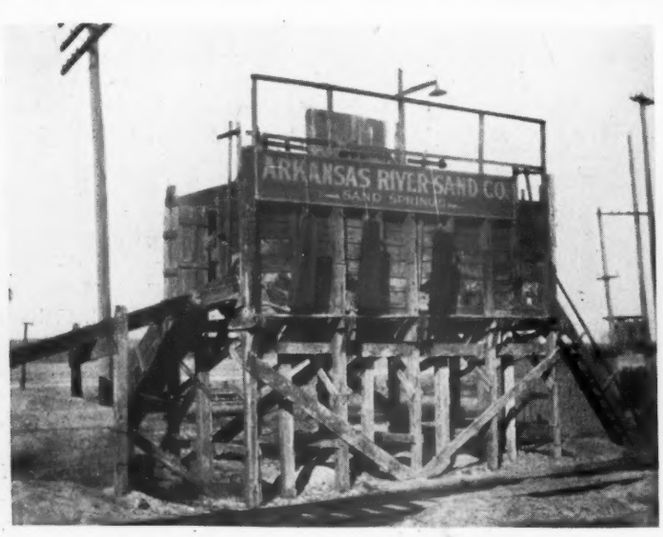
THE March 20th issue of ROCK PRODUCTS announced the formation of a $10,000,000 merger of sand plants in the Southwest, or South-Central West. I came back from the South by way of Tulsa, Okla.; Wichita and Topeka, Kan., and Kansas City, and it is along this line that most of the plants that will be included in the merger (or are affected in any way by it), are situated. Hence there was an opportunity to study the situation at first hand.

The first conclusion that one comes to after visiting these places is that there are many more plants than are needed to supply the market; between Sand Springs and Tulsa there are nine sand plants, in a distance of seven miles. A well-informed Tulsa producer estimated for me that three would easily supply not only the city trade but the out-of-town trade within a proper shipping radius. Tulsa's latest population estimate is



Typical dredging outfit working along the Arkansas river

Fowler Sand Co., Topeka, uses a traveling bucket



Settling boxes at the Arkansas River Sand Co. plant

No. 1 plant of the Wear Sand Co., Topeka, Kan.

125,000. Wichita, a town of 85,000, has seven plants. Topeka, with about 100,000 population, has seven plants. Probably three plants in each of these towns, run to capacity, would supply the market. In addition to these, in the same territory, there are two plants at Mulvane, Kan., one at Arkansas City, two at Hutchinson, two at Manhattan, and one each at Oxford and Lawrence.

Too Many Plants in District

Generally speaking, the rock products industries have had no large excess plant capacities. These industries have grown so fast that a market was waiting for the output of new plants as soon as they were erected. There was no such situation as is said to exist in the shoe industry, for example, which has factories capable of making a year's supply of shoes in three months. But in certain localities there has been an overbuilding of plants and the district under consideration is one of them. It is interesting to know how the overbuilding of plants in this locality came about.

It has taken comparatively little money to get into the sand business in this district for one reason. Conditions for pumping on the Arkansas and the Kaw rivers are about as favorable as may be encountered anywhere. This is especially true of the Arkansas river at Tulsa and some other points. All that is required is a dredge with a hull about 20x40 ft. on which is mounted an 8-in. pump and a motor which may be of 75, 100 or 150 h.p. A short pontoon line (in most cases) leads to a simple sand settling device. Some of the plants have only a hole in the ground for sand settling and others have "tipples," which are a combination of settling box and small bin. Many, but not all, of the plants have one expensive piece of equipment in the shape of a boom derrick or a crane for stockpiling sand and loading cars. But to start in the business only the small pump dredge and sand-settling box is necessary.

The output of one of these 8-in. pump dredges is hardly to be believed unless one has seen it. The sand is loose and flows freely to the suction and the lift is not great so a fast pipe line velocity can be maintained. Four cars per hour (200 tons) is considered a reasonable output at one of the Tulsa plants. The mathematically minded person who wishes to prove the possibility of such an output for an 8-in. pump will find

Screen frame and sump of the Tulsa Sand Co., Tulsa

that it can be obtained with a pipe-line velocity of 16 ft. a second and a little less than 30% of solids in the discharge, conditions easy to maintain where the sand flows freely. At times five cars have been pumped in an hour.

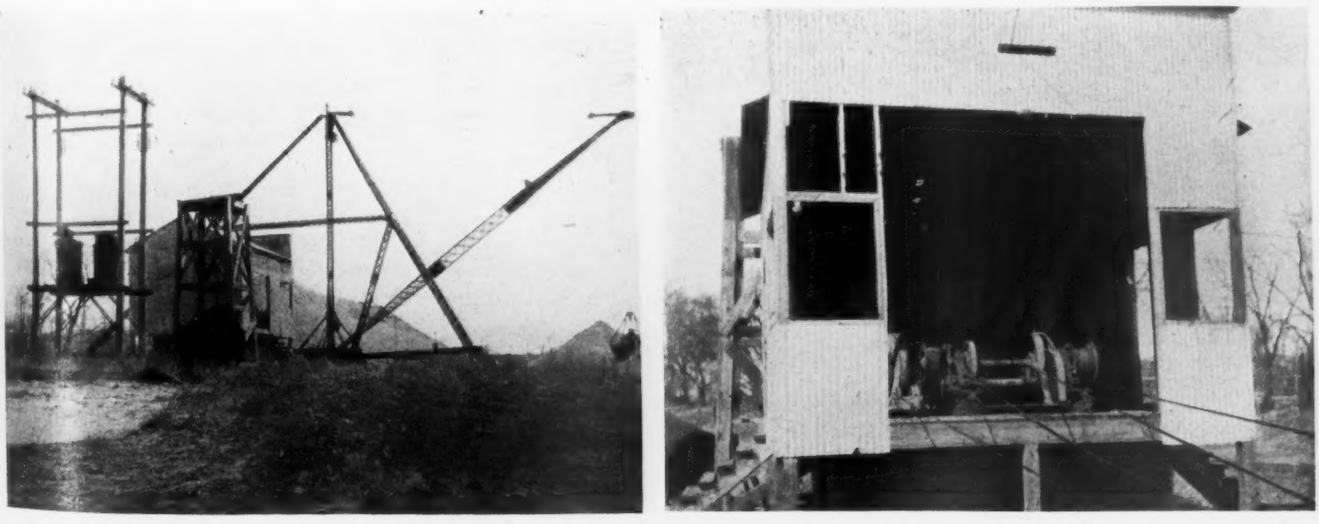
In Kansas, both the Kaw and the Arkansas rivers have been declared by the state to be navigable streams, although they will hardly float a row boat in summer. By doing this the state collects a royalty of 2 cents per ton on all sand sold, a form of severance tax. The riparian rights of the owner of the river bank make him the owner to the center of a non-navigable stream in other states and the sand man must aquire such rights before he can dredge. But in Kansas he has only to acquire sufficient room on the bank of either of these rivers for his tipple and siding and the dredge may go anywhere up and down the stream. This law made it easier to go into the sand business in Kansas than in some other states.

For these and other reasons too many plants were built and the past four or five years have been lean years for a number of producers. They admit it and are well aware of the fact that there are too many plants. Under such conditions one of two things was bound to come, a price war which would be carried to the point where the excess plants would be forced into bankruptcy and so put out of business or a merger sufficiently strong to buy out and shut down the plants that were insufficiently equipped, poorly located or which had reserves that should be held for the future. A generation ago the price war would have taken place. But this generation has learned that these industrial wars hurt too many people outside of those directly interested and that it is better to combine than it is to fight to extinction.

The present merger is not a monopoly, as it does not include all or nearly all the plants in operation. Some of the strongest companies financially are on the outside. The outcome will be interesting to watch and whether it succeeds or fails it will have in it a lesson for producers everywhere throughout the United States. As conditions are now, this district is the outstanding example in the rock products industries of the danger of too many plants.

Diminishing Sand Reserves

The writer has often called attention to the fact that the sand and gravel resources of the United States are being depleted at a faster rate than most of us appreciate. The proof of this is to be found in the result of a survey that was made in connection with the plant merger that has been discussed. To look out over the Arkansas river and see the miles and miles of sand bars one would say that the supply was in-



Typical installations at many of the small plants in the district. The derrick (left) and hoist operating it (right) are at the South Sand Co., Tulsa, Okla.

exhaustable. Yet the engineers who studied the sand supply said that within 20 years the sand would be confined to the "make in" sand which comes in with the high water stages each year. This assumes the present rate of depletion will be augmented each year in the future at the rate that production has been increasing.

The experience with dredging on the Kaw river bears out this prediction to some extent. Only a few years ago dredges found plenty of sand each year where the Kaw empties into the Missouri at Kansas City. Now the principal producing plants are 10 or 12 miles above the city and the "make in" sand has long been added to by dredging from bars and from the permanent river bottom. There is no danger of a sand famine, but the resources of the river are now measurable.

Kansas Has Plenty of Aggregate

As a whole, however, Kansas is well supplied with aggregates, according to Engineer Buck of the state highway department. A great deal of it is situated far from railroads and in inaccessible places, but so far as highways are concerned, there will be enough that can be readily obtained. Not all that is counted as highway material is sand and gravel, however. There are many limestone ledges in the state, and while some of them are soft, others are of good quality.

Limestone that makes good aggregate is quarried near Topeka and one ledge recently opened is reported to be good for building stone.

"Gyp gravel" is a peculiar road material found in the central part of the state. It has something of the same self-cementing qualities as the Ocala limestone in Florida from which so many miles of road have been built and it is being extensively used in the parts of Kansas near where it is found.

Plant of the Hughes Stone Co., Tulsa, which dries crushed stone to clean it

In Tulsa both stone and gravel are used as coarse aggregate. The gravel comes from the Grand river and Muskogee is the principal center of production. It is of excellent quality and is heavily produced at present, but the reserves are said to be not very large. Time did not permit me to visit the district. In the main, the city of Tulsa depends upon the limestone quarries near the city for coarse aggregate and the operations of two of these are almost unique in their methods.

Unique Method of Cleaning Stone

The Hughes Stone Co. has a very extensive area covered with limestone which has been worked for 11 years. The stone itself is of excellent quality, but there are occasional thin seams of shale from ¼-in. to ¾-in. in thickness, and of course a little dirt gets in sometimes from the overburden. The method of cleaning the stone is the unusual feature. The rock after crushing is separated on a ¾-in. screen, and the fines contain all the shale and dirt. This is dried in a rotary dryer and put into the sizing screen along with the coarse sizes and the shale and any lumps of dirt that may be present are broken up so that they pass through a ¼-in. screen. Hence all the sizes above "screenings" are of clean stone. The company is fortunate in owning its own gas well, so that the cost of fuel is not an important factor. At the price of gas, 18 cents per 1000 ft., it would be possible to buy gas and still use the method, for on a basis of heat units the gas costs about half as much as coal at $4.50 a ton. In places where fuel is not cheap the economy of such a method would be doubtful. It has attracted a great deal of attention and producers from other parts of the country have come to Tulsa to see it, hoping that they might apply the method to their own production.

Zenith Limestone Co.'s plant near Tulsa, Okla.

An Unusual Crushing Plant

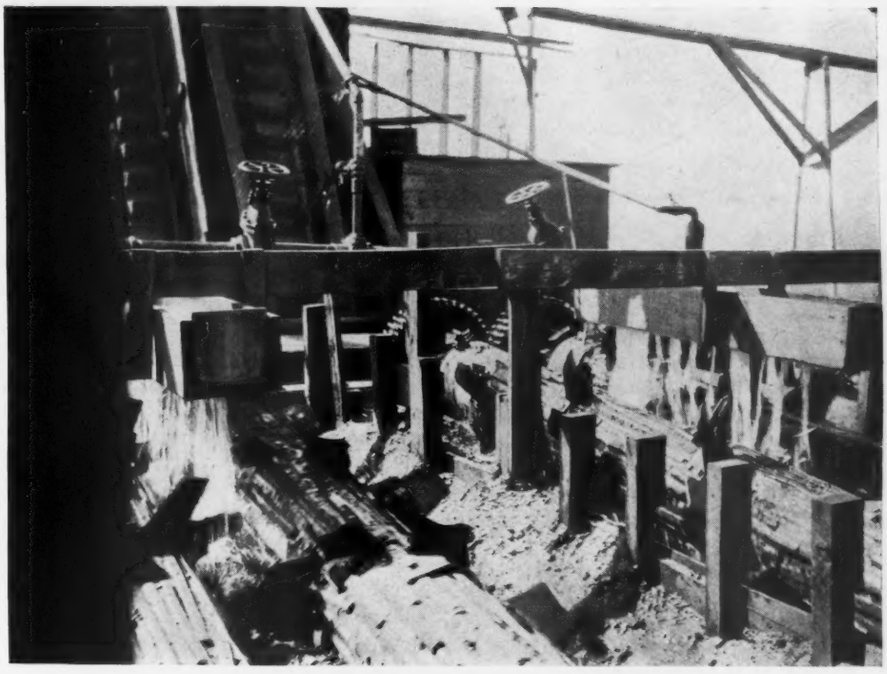
The Zenith Limestone Co. has its quarry and plant at Price, about five miles out of the city. The quarry has presented a troublesome blasting problem from the fact that the lower part is not stratified and it tends to break into large blocks which must be block-holed and shot again before the pieces are small enough to send to the crusher. The rock is on a soft shale bottom and tends to slide out as a mass instead of fragmenting. Experiments have gone on for two years and a method has now been worked out which seems to have solved the problem. It will be described in detail later.

In building the plant at this quarry advantage was taken of a very steep hillside to set the crushers almost over one another. There are three crushers with bar screens between. The operation is very rapid. In

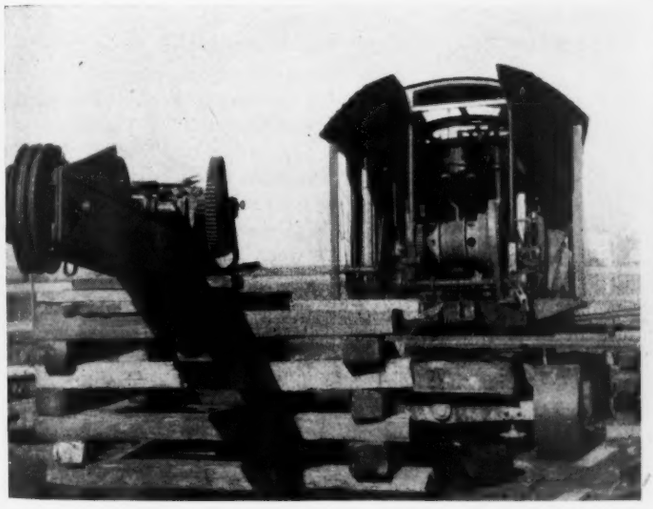
less than a minute a rock thrown into the primary crusher is broken down to finished size and is on its way to the sizing screens above the bins. The plant has a number of ingenious features including a system of cleaning off any dirt by a specially designed gravity screen which has been patented by the manager, R. O. Long.

A third quarry at Tulsa is that of the Quality Stone Co. near Sand Springs. The ledge is presumably the same as that worked by the Zenith Limestone Co. The proprietor, W. L. Moody, has worked it as a hand drilling and loading operation for several years, crushing in a small plant with a No. 5 and a No. 3 crusher. Now he and his associates are preparing to quarry on a good sized scale, as they have developed a face nearly half a mile long and 43 ft. high. As in the Zenith quarry, the rock is not stratified but good fragmention is secured by working the rock in benches with hand operated pneumatic drills and plenty of holes.

On the day the plant was visited the setting of the primary crusher for the new



Log washers wash entire product of Peerless Flint Gravel Co., Wichita, Kan.



Left—Unloading steam shovel for Quality Stone Co. Right—Installing primary crusher at plant of Quality Stone Co.

Left—Present crushing plant of the Quality Stone Co., Tulsa. Right—Quarry face. Note the unstratified lower part

plant had just been completed. This is a No. 30 McCully gyratory. Hand loading will be suspended by steam shovel loading and a Bucyrus shovel had just been unloaded and was being set up when the plant was visited.

Using Log Washers on Gravel

In this trip I was fortunate in seeing a member of unusual plant operations which had successfully solved difficult problems of production which came from local conditions. One of the best illustrations of what this means is the plant of the Peerless Flint Gravel Co. at Douglas, Kan., about 30 miles out of Wichita. The company's name is well chosen, for the gravel is flint and nothing else that I could see. There is a range of low flint covered hills running through four or five counties, according to the state highway department. They lie above limestone ledges and it appears that the flints have come from the disintegration of the upper part of the limestone. The deposit of flints varies from 6 to 12 ft. in depth.

But the disintegrated rock has turned to a clay of the stickiest, gummiest kind you can imagine. The flints are embedded in it and covered with it. As they are dug out of the ground they look like lumps of brown mud. Ordinary cylindrical washers were tried at another plant and proved a failure. The plant had to shut down because it could not produce clean material. Then Watt Sleeth, who is now superintendent of the Peerless plant, built a pair of log washers like those he had seen working in Tennessee on iron ore and they did the business. The log washers at the Peerless plant were built by Mr. Sleeth and they are very successful in putting through the tonnage at a low cost for power and repairs. The plant will be described in detail later.

Permeability of Stone

A PROPERTY of stone which has been studied but little and which has often been left out of consideration entirely by practical men is its permeability. Since it is very important to maintain the interior of buildings as dry as possible, it is evident that a knowledge of the relative permeability of the various materials used in wall construction will be of value in the selection of a material for a given purpose. All stones, both natural and artificial, are porous, but not to the same degree. Some stones are so dense that only a very small amount of water can pass through them, while others are so porous that they offer but little resistance to the passage of water.

While the permeability of stone is of interest mainly in connection with the prevention of dampness in masonry buildings, it also has other applications. In connection with the durability or resistance to frost it appears that the permeability of a stone has considerable bearing on these properties. Efflorescence on masonry is a source of annoyance, not only because it produces an unsightly appearance but it frequently causes extensive deterioration. Since efflorescence is due largely to the leaching of water through the masonry which carries water-soluble materials to the surface, it is evident that permeability is a consideration of importance in this problem. Further, knowing this property of a stone, it appears that a permeability test affords a sound basis for determining the value of various waterproofing materials and methods when applied to different types of stone.

From time to time a number of studies have been made of the permeability of concrete, but very few measurements have been made to determine this property for other materials. Recently an apparatus has been developed at the bureau for experiments on natural stones. Several types of stone have been studied in a series of preliminary tests for comparative data and to determine the adaptability of the apparatus to a considerable range of materials.

A paper describing the new permeability apparatus for making these tests and giving the data obtained by experiments on several materials is now being prepared as one of the bureau's publications.—*Technical News Bulletin,* U. S. Bureau of Standards.

Hydrating Lime for Bleach Manufacture*

THE results given herewith are the outcome of the Interdepartmental Conference on Chemical Lime, which is engaged in preparing specifications for lime used in the various chemical industries. A pure lime is known to be necessary for a good product; many impurities affect the rapidity and completeness of the chlorination and also the keeping qualities. Another important factor, and the one forming the subject of the present investigation, is the proportion of water used in hydrating the lime. On both of these points the data are few and somewhat conflicting.

The original material used in this investigation was chemically pure quicklime ground in a ball mill for 1½ hours and screened through a No. 14 sieve. The ground material was then bottled until ready for use. There was some exposure to the air resulting in a slight amount of air slaking of the lime during this process. The lime was next slaked by adding a known weight of lime to a definite amount of water. The maximum temperature during this process, and the time required to reach this temperature, were noted and the resulting hydrate allowed to cool over night. The maximum temperature was usually greater than 100 deg. C., and consequently some water was lost by evaporation.

To investigate a few other factors, three special hydrates were prepared. The first of these was made by adding the lime to a large excess of water, allowing the mixture to stand for several days, and after decanting the excess water, drying the resulting hydrate in an oven at 120 deg. C. The second of these special samples was made by slaking the lime to a putty, using a considerable excess of water, drying the product in the oven at 120 deg. C. and grinding. The third sample was slaked with and cooled by steam, the sample being allowed to remain in a steam bath for 20 minutes. The hydrates after being prepared as above were analyzed for free water, loss of weight on ignition, calcium carbonate, calcium oxide and calcium hydroxide.

The process of chlorination used was very simple, resembling in this respect at least that used in practice. Chlorine was generated by the action of HCl on manganese dioxide in a Kipp generator, the resulting gas being led into an Erlenmeyer flask on the bottom of which the sample of hydrate was spread in a thin layer. About 10 gm. of hydrate was used in each case. Care was taken to have the same pressure in the flask at the start in each case. Each sample was exposed to the chlorine for 24 hours and at the end of this time its increase in weight was determined.

Immediately after the completion of the chlorination process the bleaching powder produced was analyzed for available chlorine, using the method of Wagner. Chlorine content was again determined on the bottled bleaching powder which had been allowed to stand in subdue liquid for 30 days. Other tests made were on the density of each sample and the rate of settling.

Conclusion

In order to produce an entirely satisfactory bleaching powder for commercial use the amount of water used in hydration of the quicklime should be carefully controlled, but the care required is not more than can be easily applied in practice. The range of water of hydration for such a bleach is wide enough so that unavoidable errors in quantities used will not appreciably affect the quality of the product. The percentage range found in this work to give best results is from 32½ to 55% of water, based on the weight of quicklime used. The most satisfactory product was obtained between 45 and 50% in which the lime was almost completely hydrated, little or no free water being present. It has previously been considered that about 4% excess water gave the best results, but this work, while showing a good bleaching powder to be made from such a hydrate, indicates that the amount of free water should be somewhat less since the strength of the bleach falls off very rapidly with increased water above this point. Thus a small error causing the addition of a little too much water would cause a serious loss in strength of the product. Forty-five per cent of water, based on the weight of lime, could well be recommended, since this is well within the limits prescribed.

*Abstract of article of same name by D. F. Richardson, W. E. Emley and J. M. Porter, all of the U. S. Bureau of Standards and printed in *Chem. and Met. Eng.*, Dec., 1925.

This sand plant is so unusual in appearance that passers-by do not know what it is

Sand Plant That Looks Like a Still

New Operation of the Hindered Settling Classifier Type Designed by John Prince

THE Stewart Sand Co. has recently built a plant on the Kaw river near Kansas City, Kan., that attracts a great deal of attention from its unusual appearance. It is generally taken for some sort of chemical works. It is all steel and very compact, yet it contains a gravity screen, a revolving screen, a crusher, a gravel washer, five sand classifiers and conveyors to load the products to cars or stock piles.

A dredge pumps to the plant and the discharge goes over a gravity screen to take out the greater part of the sand and water. The remainder goes to a revolving screen where the gravel is separated. All the gravel goes through a jaw crusher where the larger pieces are crushed to less than 2 in. in diameter. The feed contains about 10% of gravel.

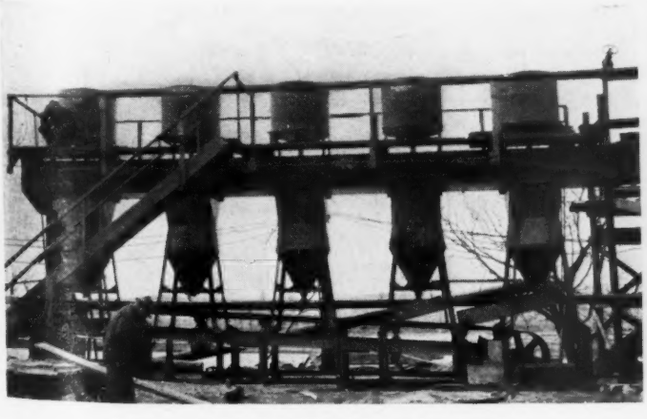
As the gravel contains some sticks and trash it is passed through an Eagle washer before being sent to the cars or stockpile.

Five Steel Classifiers

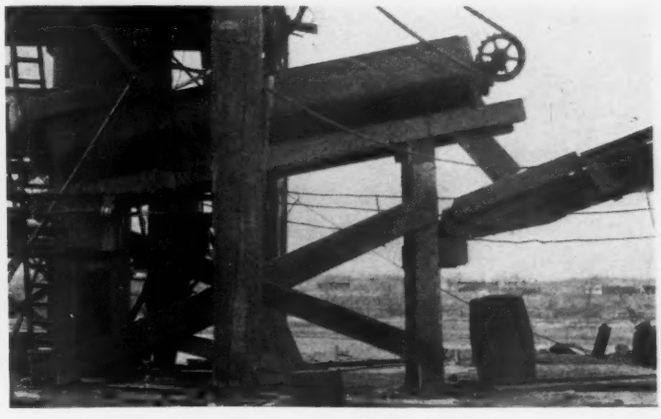
The sand and water from both screens flow through a series of five classifiers with rising current water. These are of the hindered settling type and the discharge is sufficiently dewatered to be handled on a 30-in. conveyor belt.

The reason for five classifiers is to control the grading of the sand. If the dredge is pumping coarse sand, all classifiers will discharge on the belt. If it is pumping finer sand, with too low a fineness modulus for concrete work, one, two, or even three of

The screen, crusher, and gravel washer are at the left of this picture



The five sand classifiers



Gravel washer for removing trash

the classifier discharges may be turned to waste.

In working a river bottom systematically, as it should be worked, there are times when fine sand is encountered and some method of controlling the grading is needed.

The entire plant is run by a General Electric 25-h.p. motor through a silent chain drive. The machinery, where not otherwise stated, was furnished by the Link-Belt Co.

It is to be noted that this is primarily a sand plant. If the feed contained a large proportion of gravel and if more than one size of gravel had to be made it would be necessary to make some additions. These would be an elevator to take the crushed oversize back to the screen, in order to insure an even product with the crusher set to give sufficient capacity, and a second revolving screen to size the gravel after it had passed the Eagle washer. These screens might be placed above bins for holding the various sizes of gravel.

The plant was designed by John Prince, president of the Stewart Sand Co. The hindered settling classifier is of a type which has been developed at the plant and of which a number are already in use at the various plants belonging to this company. A patent has been applied for on this classifier.

Canadian Gravel Company Changes Owners

AT a price reported to be $180,000 the Producers' Rock and Gravel Co. of Royal Bay, Esquimalt Harbor, Victoria, B. C., has been sold to Vancouver interests led by Messrs. Davidson and Cassidy. The sale was put through at a recent meeting of the company.

The two Vancouver men, it is understood, will form a company. Mr. Davidson is connected with the Pacific Construction Co. of Vancouver. Mr. Cassidy is a contractor of considerable experience.

The plant was established in 1907 when the site of the pit was sold to the company by C. Whitney-Griffiths. It has grown steadily since that time and has supplied materials for many big construction jobs both in Victoria and in Vancouver. It is understood that the new owners will operate under the same name and except for the change in ownership there will be no big alterations.—*Victoria (B. C.) Times.*

United Fuel and Supply Co. Reorganizes

THE United Fuel and Supply Co., Detroit, Mich., has been formed to acquire certain of the assets of the old company of the same name and also has acquired certain of the assets and business of the Superior Sand and Gravel Co., Detroit, Mich., Birmingham Sand and Gravel Co., Detroit; Superior Plaster Co., Detroit; Delta Brick and Tile Co., Detroit; and the Detroit Steamship Co. The company will engage in the sale of fuel and the manufacture of plaster and cement products as well as the production of sand and gravel.

The company operates 18 yards, 8 of which are located on the Detroit river and owns a fleet of 7 steamships and 148 motor trucks, cars and tractors. Offices will be maintained in the Transportation Building, Detroit.

Sand Dredging Thirty Years Ago

History of the First Sand and Gravel Operations of the Charles Warner Co.

By Captain E. F. Wilkins

AS I look upon the modern Penn and Manor plants, producing thousands of tons of sand and gravel products each day, I often think of the day 32 years ago when I first became connected with the Charles Warner Co., and when the Warner company first entered the sand and gravel business in a modern way.

I well remember one October day in 1892, just a few days prior to the election of Grover Cleveland as President of the United States, I was called into the office of the National Dredging Co. for whom I was working as captain of the dredge "Alva." Mr. Barker, who was president of the National company, instructed me to put a short boom on the dredge "Alva" and go out digging sand for the Charles Warner Co. and to explain to them the good and bad points of the dredge. He told me that the Charles Warner Co. was contemplating building a new dredge and that he was trying to sell the "Alva" to them. I did as directed and hauled the dredge "Alva" to the mouth of the Christiana river and anchored there, awaiting a Warner tow boat.

Testing Out First Dredge

The following day the Warner tug came out with Captain Betelle and Captain Davis on board with orders to prospect for bar sand. This we did, going back and forth across the river and up as far as Miflin bar at the mouth of the Schuylkill. There we found a good deposit of sand and stayed until Thanksgiving morning that year when we received orders to move down to Goose bar below Finns point jetty. Here we stayed until the river froze up about two days before Christmas.

At that time the Warner company had but three barges, Nos. 1, 2 and 3, of 200-yd. capacity and in addition chartered two or three small boats and three small schooners. The "Alva" had no equipment for washing sand and this was simply dredged out of the river and dumped on the barges in its natural state. At that time the company was only interested in bar sand as concrete sand was practically unknown.

The 200-ton lighters soon became too small and worn out and the company contracted for three new barges, Nos. 4, 5, and 6, of about 300 tons capacity. These were built at the Jackson and Sharp plant in Wilmington. During the next few years additional barges were built up to No. 12 and a New No. 1, 2 and 3 of larger capacity.

About this time it was found that market conditions required sand to be washed and a washing machine was installed on the "Alva" at the Jackson and Sharp plant. While this work was being done it was found that the hull was very rotten and the company decided to partially rebuild her. This was done and she again went into commission.

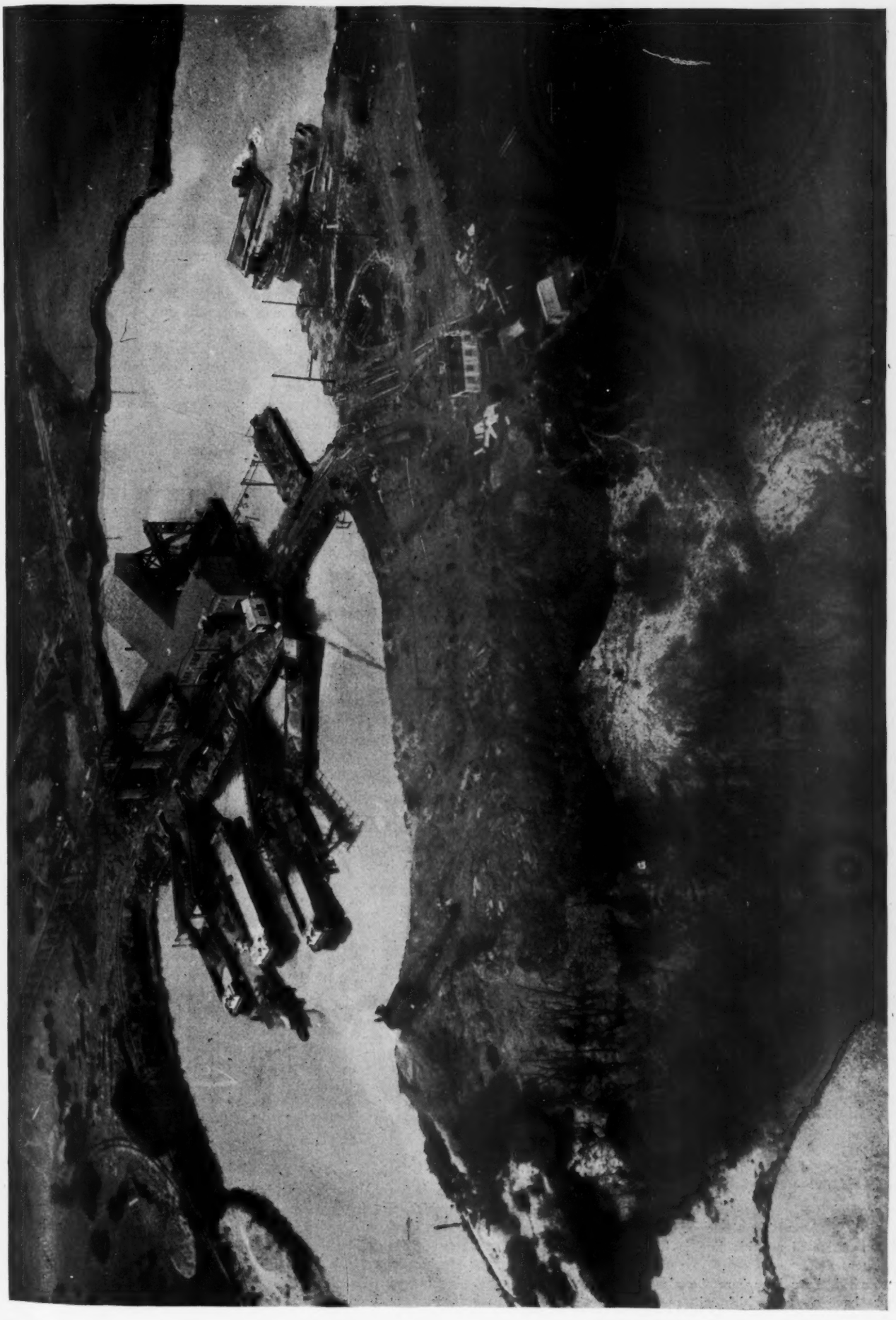
Loss of the "Alva"

Shortly after this on a Sunday morning, the 26th of July, 1897, I was called from my bed with the news that the "Alva" was on fire. I hastened to the wharf at New Castle and asked a tow boat there to take me to the dredge. There was already one tug alongside the dredge trying to put out the fire but we soon saw that it was hopeless. We therefore decided to tow the dredge into shallow water and sink her. This was done but not until the dredge was so badly damaged that it could not be repaired.

That was the end of the "Alva." The very next day the Warner company placed a contract with the Jackson and Sharp plant for a new dredge and the hull was built and launched in 18 days and the dredge was completed and ready for work in two months from the day the "Alva" was burned. The new dredge was named the "Phoenix," as like the "Phoenix" of old, she arose from the ashes.

On September 26, 1897, the "Phoenix" started out from Wilmington and was towed to Goose bar for trial. The "Phoenix" was equipped with a bucket elevator and flat screen. It was found that she would clean and wash about 60 tons of sand per hour, which was considered a very fair tonnage at that time. A few years later, however, as business increased, it was decided to try a rotary screen which was even more successful. This dredge produced a large quantity of sand at the time of great demand during and following the World War which was the second war since the dredge was built.

With the later history of the sand and gravel department most of us are familiar, but I thought that this little account of the time when 60 tons an hour was considered a large tonnage might be of interest.—*The Warner-American News.*



Aeroplane view of the Charles Warner Co.'s Manor plant, the chief source of supply for its sand and gravel products. Sand and gravel is dredged by the dredge, "J. W. Betelle" (not shown), loaded onto sand barges and towed to the unloading hoist of the Manor plant, where it is washed, screened, and loaded on barges for transportation to Philadelphia and other market points. In the above photograph, a tug is towing a loaded barge to the plant while another barge is being unloaded. Nearby is the new dredge, Captain E. F. Wilkins, which is in process of construction. To the left are barges being loaded for market

Producing Glass Sand to Specifications

Experiences of a Producer in Trying to Meet Specifications

By H. U. Kelley
Guion, Ark.

THE time is rapidly approaching when the producer of silica must size his product. If it is to be a coarse sand it must all be coarse and if a fine sand it must be free of the coarse material.

This is partially due to the increase in the number of uses for sand. It would not now be considered a safe venture to build a plant to produce sand for glass making alone, unless the producer was secured by a long-term contract from some very strong company. Some one concern which used enough sand to afford him a profit on producing for them alone.

It has been only a few years since the glass factories used the bulk of high-grade silica sand produced. Also, it might be noted that the country was dotted here and there with small factories, making glass by hand.

These factories, individually, used a comparatively small quantity of sand. They usually operated only a short period each year, employed no chemist and consequently had their "ups and downs."

The last five years has seen a marvelous change. The hand plant is no more, the machines have gained the ascendency. To be brief, in the struggle for existence, practically all have tried to replace the hand process with machines. Since this installation was very expensive it has resulted in the elimination of a number of the smaller concerns.

During this period of transformation and in less than five years, a new company has sprung into existence and is, at the present time, producing 40% of the window glass used in the United States. This same company is so rapidly invading the plate glass field as to cause cuts in the price of plate glass, the like of which has never before been known.

In fact the competition between this and one other company is so keen at the present time that one glass man is recently quoted as saying that there is no money in the glass business if you have to pay a royalty on your machines.

More Knowledge of Glass Manufacture Makes Sand Producers Lot Harder

But we are going off at a tangent. This is only intended to show that the range of technical knowledge along this line is becoming greater.

It has reached the point where the glass maker must have a sand which will meet certain well defined specifications as to purity and grain size and if the producer is not favored with a deposit in which the natural grain size will meet these specifications, he must prepare to size his product.

The screening of silica sand presents a problem which is so variable that no data gathered at one place seems to work out at another.

This applies particularly to the St. Peter sandstone. Most reports would indicate that the results obtained in handling the Oriskany sand are much more uniform. However the writer is inclined to believe this is due to the fact that the Oriskany sand is, as a whole, somewhat coarser and probably more uniform than most of the St. Peter sand.

It happens to be that the Eastern sand may be screened fairly successfully through a 12- and 14-mesh screen and the glass factories seem to be able to use this product. But when you move westward to the St. Peter sand, your screening problem becomes much more complicated and so does the specifications of the glass factories strike you with their diversity.

In attempting to size your product, the following will be well to keep in mind: One is the cost of installing machinery; another is the efficiency of equipment, maintenance and the percentage of your product which must be thrown away. If you have a large production are your favored with an economical means of disposing of this waste material?

Fines Undesired

The glass maker has learned from experience that the "fines" in the sand usually carry most of the impurities; and when we speak of "fines," we usually refer to that material which will pass through a 200-mesh Tyler standard hand sieve. However, recently, there has been a tendency to apply this term to material passing through a 100-mesh sieve.

In addition to the above, it has also been discovered that a small quantity of aggregate will materially affect the quality of the glass.

To date, we might say that the glass maker must have a sand which contains a minimum of impurities, also it must consist of perfectly segregated grains. Thus we arrive at the major specifications which a producer must meet. On investigation it will be found that each factory has its individual specifications which are usually more exacting than the above.

The present tendency among glass technologists runs toward a very uniform sand of medium grain size. So if your deposit is not uniform the product must be made uniform by sizing. But before going into this it is imperative that you investigate the possibilities of a market for three or more grades of material.

Other Markets Hard to Find

At first glance it would seem that there were any number of markets for a perfectly sized product, but when you begin searching for a market for material which is too coarse for glass making and a market for the material which is too fine for this purpose, you will find your field very limited.

Our first thought for the coarse material would probably be its use for sand blast. Since there is a reasonably large demand for this material we will accept it as a market for the coarse material. They use silica in making paint and soap, also they use it in porcelain and for glazing pottery. But most of this material must be a very pure silica and in the form of an impalpable powder, fine enough to pass through a 300-mesh sieve.

Since, as stated in an earlier part of this article, the finer material usually carries most of the impurities found in silica sand, we would readily suppose that the "fines" would not be as pure as some of the coarser material, particularly insofar as the iron and alumina content is concerned. Bearing the above limitations in mind, it occurs to the writer that the pottery field offers the most promising market for the finer material without further treatment. The specifications for silica for glazing purposes, does not call for as pure a sand as some of the other uses and it does not have to be as fine.

If it so happened that 10% or even 5% of your product was this fine material and had to be thrown away, you can see what would happen to your costs.

The Problem of Sizing

It is the man who has the deposit of non-uniform sand who must take drastic steps if he is to hold his trade. He hears quite a lot of miscellaneous talk about screening, the trade papers are full of advertisements of screening devices but he is afraid to risk his judgment. He would

rather see what the other fellow is doing.

A visit to several plants convinces him that washing is the only logical method of grading his product. After consulting the best source of information available, he designs a system of washing tanks and drain bins only to learn to his sorrow, that they will not function properly.

First, it would not eliminate all the fines, then it will not work up to the expected capacity. It will not drain as readily as he had supposed.

To try to eliminate more of the fines, he increases the speed of his settling tanks and overflow only to learn that this is carrying off with the waste, some of the desirable material. About this time he discovers that his deposit is stratified and only a small portion will go down in water. To work this small seam alone, his quarry would advance too rapidly for economy.

It all seems very promising and would probably admit of a solution but he cannot forget his regular production and too, the costs are growing into an enormous figure.

Necessity forces him to abandon this project and return to the old methd to maintain production while he casts about for some other means of sustaining himself.

Can't See Possibilities in Air Separation

The next thing to catch his eye as a probable solution is an air separator. This machine is very highly recommended for the handling of all fine materials. On inquiry, he finds that none of the manufacturers have had any experience in handling silica sand. Will they permit him to install a machine and guarantee it to give satisfaction? They will not, but he does get some of them to test a sample in their laboratory.

Most of these companies are frank enough to admit that they cannot get a perfectly sized product with one machine. It might be that by installing more than one machine he could get a reasonably clean product. In other words, they can take out the "fines," but with them there would be from 5% to 15% of the coarse material and there would be from 2% to 5% of the fine material in the coarse product.

Although fatigued with the uncertainty, his trade will not permit him a moment of rest. They are again dinning in his ears their several specifications which must be met if he is to keep their business. The poor producer shivers in his boots when his largest purchaser sends a technologist to examine his quarry and method of preparing the sand.

Satisfactory Separation an Unsolved Problem

The next thing to attract his attention is a vibrating screen. Although this machine failed to function satisfactorily when tested, it cannot be said that these tests were anything like exhaustive.

As mentioned before some of this sand is more or less stratified and before purchasing this last piece of equipment, the producer had made a very careful examination of his deposit and found that there was one strata in the quarry which would meet the specifications of the glass trade without much preparation and naturally he made preparations immediate to open this seam.

Because this worked out so nicely is one of the greatest reasons why this last machine was not tried out more exhaustively.

Since the very trying experience mentioned above, and the temporary relief gained by selection of the product, he has discovered that there is not known, at the present time, an economical method of dry screening silcia sand, of non-uniform grading size, below 20- or 35-mesh.

Rock-Dusting Coal Mines Fully Justified

ROCK-DUSTING of bituminous coal mines as an explosion preventive is making sure, but show headway. The mine accidents of the past winter have furnished ample evidence of the efficiency of rock-dusting. We print below an editorial from *Mining and Metallurgy,* the monthly journal of the American Institute of Mining and Metallurgical Engineers, as evidence:

"Rock dusting of coal mines has received whatever vindication it still needed since the first of the year. The one cheering feature of the series of explosions that has marked the weeks just passed has been the uniformity with which initial explosions have been smothered by the rock dust. In the case of the Orient mine in Illinois, the state commission which investigated the explosion wrote the company, "had it not been for the fine condition of the mine and the fact that the mine was rock dusted very thoroughly, undoubtedly you would have had the greatest disaster at your mine in the history of mining.' This is at once a commendiation of the practice and of the management that is most welcome. Danger from explosions is especially important in the great mines now being opened where the number of men exposed to the risk in each property is much larger than in former days and it is a fine tribute to engineers that means of localizing explosions have been developed. It is important that the rock dusting be done thoroughly and the institute recently joined in approval of a tentative standard which is felt to afford proper guidance to engineers seeking the best practice. A little misunderstanding as to this has crept in. The standards set are of the total amount of inert material present at any time or place. Mines in which, by reasons of roof slate, partings or other natural features there is already present a large amount of such dust need only to add such a quantity if any as may be necessary to bring the percentage up to the safe limit. Cost figures over a long period are not yet generally available but those over the short initial period, when they should normally be higher than the average, collected by the Bureau of Mines and Carnegie Institute of Technology, amount to a fraction of a cent per ton. In the judgment of experienced operators in the Pittsburgh district thorough rock dusting will not add to the cost of mining coal more than two cents per ton at most, and probably not much if any more than half that amount. This is a small sum to pay for the increased safety of the men in the mines."

Fineness of Hydrated Lime Investigated

THE U. S. Bureau of Standards has recently undertaken an investigation to obtain more information on the fineness of hydrated lime. It is known that the majority of the hydrates can be screened through a 200- or even a 350-mesh screen, but beyond this point the size of the material has been a much-debated question.

The first step in the work was to find a method of separating the different size particles of the hydrated material. Various elutriation and flotation methods were considered, and it was decided to try the air elutriation method, used and developed by the bureau for determining the fineness of portland cement. This method was accepted because other methods employed liquids as elutriation mediums which, if used with hydrated lime, would require the use of non-aqueous liquids and, in addition to this, the methods did not appear to be entirely satisfactory for accurate separations.

Preliminary determinations with the apparatus described indicated that from 83 to 90% of hydrated lime is finer than 0.02 mm. (20*u*) in diameter. Separations were made with other equipment capable of separating material less than 0.01 mm. in diameter, and it was found that from 70 to 75% of the material was finer than 0.01 mm.

Measurements of this material were made with a microscope employing a 4-mm. objective. It could be readily seen, when measurements were being made, that the larger particles were formed from agglomerations of smaller particles that appeared to be about 0.001 mm. in diameter. There was a considerable quantity of the particles of this size on the slides, but it was impossible to measure, with any degree of accuracy, particles less than 0.003 mm. in diameter.

The presence of the smaller particles and agglomerations of them raises a question relative to the fineness of the hydrate. Whether or not the majority of the material can be separated into particles of 0.001 mm. or less in diameter is still to be determined. Plans have been made to modify the method with such an object in view. However, it has been determined that approximately 85 to 90% of hydrated lime is finer than 0.02 mm. in diameter, and that 75% is finer than 0.01. The sizes of these particles are equivalent to material passing theoretical 750- and 1500-mesh screens for the 0.02 and 0.01 mm., respectively. — *Technical News Bulletin,* U. S. Bureau of Standards.

A Many-Sided Quarry Operation

Oakland Paving Company, Oakland, California, with Quarry as a Basis, Sells Dry-Mixed Aggregate, Building Materials and Executes Paving Contracts

A GOOD EXAMPLE of West-Coast enterprise in operating a quarry for the most possible profit is that of the Oakland Paving Co., Oakland, Calif. With a quarry operation as a nucleus, Frank W. Bilger has built up a varied business to market his crushed stone to the best advantage.

The rock quarry is situated at McAdam street and Broadway and is approximately the geographical center of the cities on the east side of San Francisco Bay, delivering to all points by motor trucks. The property comprises about 50 acres of ground and has been in operation for over 50 years. The quarry produces approximately 1000 tons per day of commercial sizes.

At the present time the excavating equipment consists of two Osgood ¾-yd. steam shovels, with steam locomotives and steel dump cars on narrow-gage track to transport the stone to the primary crusher, which is a No. 8 Gates gyratory. The material passes from the No. 8 over conveyor belts to scalping and sizing screens, from which the rejects pass through two No. 5, one No. 4, and one No. 2 Gates gyratory reduction crushers, being then returned to the sizing screens.

The plant bin capacity is about 500 tons of various sizes of rock, loading directly into motor trucks for shipment. The complete plant, including the compressor units, is operated electrically. Last winter a 60x48-in. Allis-Chalmers jaw crusher was installed as a primary crusher. This will deliver to the present No. 8 gyratory.

Dry-Mixed Aggregate

In connection with the quarry, the company operates a commercial dry-mix aggregate plant, which is particularly popular with the trade. This plant receives in its bunkers, directly from the trucks, four sizes of rock and sand. These are properly proportioned by the use of Blaw-Knox batch hoppers, which discharge into a mixer drum, which in turn delivers the mixed dry aggregate directly into trucks for shipment.

The sand comes from the Canyon Gravel Co., a subsidiary of the Oakland Paving Co., which operates a sand and gravel washing, crushing, and screening plant at Niles, Calif., approximately 20 miles south of Oakland. This plant is a standard slack-line excavator type, electrically powered, and produces approximately 400 tons of commercial sizes of sand and gravel per day.

Frank W. Bilger, president of the Oakland Paving Co.

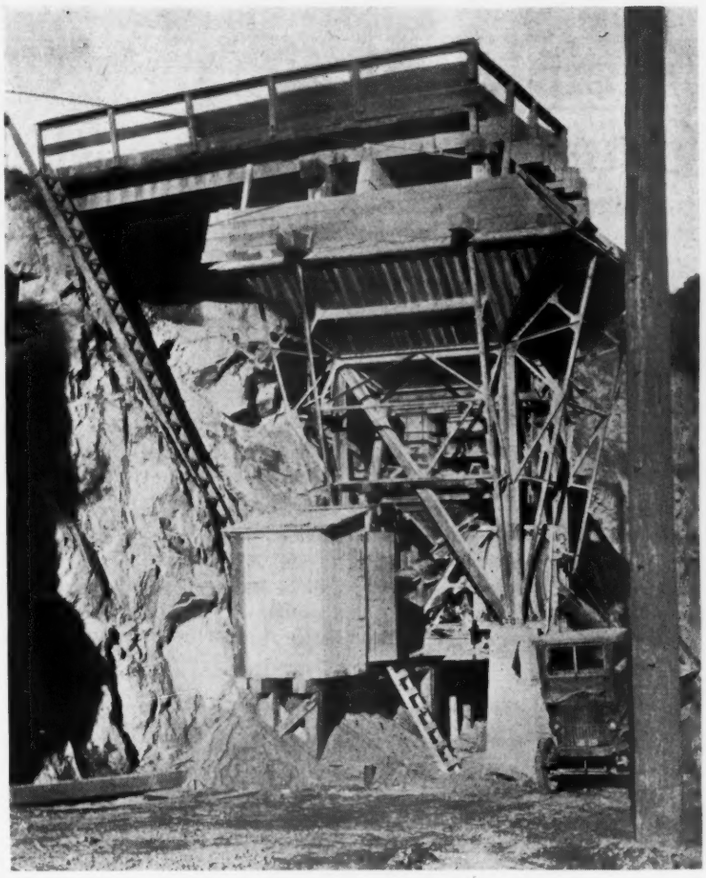
The allied Oakland Building Material Co. operates five building material yards in the East Bay district, through which the

New quarry of the Oakland Paving Co., Oakland, Calif., which now furnishes about 1000 tons per day of mixed sizes of stone. An older quarry has been operated for the past 50 years

products of the Oakland Paving Co. quarry, Canyon Gravel Co. and other building materials are marketed at retail.

The Oakland Paving Co. also has contracted for street pavements in this district for the past 50 years, and during the past season completed about $750,000 worth of such street work.

At the head of the Oakland Paving Co. and its subsidiaries is Frank W. Bilger, who became associated with the company over 30 years ago as an employee and is now president, manager, and sole owner of the company. He has proved himself a man of rare ability and vision and has overcome many obstacles in the gradual progress of this concern. Notwithstanding his close application to business, he has had time to devote to outside interests, and has been active in many municipal and fraternal organizations which stand for the betterment of the community. One dream he has realized in the upbuilding of his business is the association with him of his three sons: Anson S. Bilger, secretary and superintendent of street construction; William F. Bilger, efficiency expert, and Frank W. Bilger, Jr., superintendent of motor transportation.



Batcher mixer at the Oakland Paving Co.'s plant for making dry mixed aggregate

New Uses of Diatomaceous Earth

LARGE deposits of comparatively pure diatomaceous earth exist in various parts of Nevada, but the production is at present limited to small quantities for local consumption and to small shipments for miscellaneous uses, according to the Bureau of Mines, which has investigated the matter. That consumption is only local, is due to the occurrence of large deposits more favorably situated with regard to transportation facilities and to the competition of producers who have highly specialized plants in operation.

The Bureau of Mines suggests three fields in which the consumption of diatomaceous earth is sufficient to consider them as outlets for the Nevada material. These are the building trades field, production for use as insulation and production for use in filtration.

Diatomaceous earth consists almost entirely of the silicious remains of minute aquatic plants known as diatoms, states C. W. Davis, assistant chemist, in a report just issued by the Bureau of Mines. Diatoms live in all kinds of water, fresh or salt, hot or cold, still or running and under various conditions of depth and pressure. These minute plants take silica from the water in which they live and produce opal (silica) skeletons (not of the precious variety) much as mollusks secrete lime and form their shells. When the diatoms die they settle to the bottom together with anything else which may be present, such as sand, clay or volcanic ash. The organic matter gradually disappears leaving the silica skeletons which, with impurities, make up the deposits of diatomaceous earth. These deposits are being formed at the present time and have been produced since the Tertiary age, during which time they flourished so mightily that the thickest beds so far discovered are of that age.

Filtering Material

The most important industrial application of diatomaceous earth is as filtering and clarifying material. The consumption for this purpose is large, and although the material must be comparatively pure and requires special preparation, its price is sufficiently high to stand shipping to distant points.

A second extensive use for this material is as an insulator. This field is at present being greatly enlarged, as the economy effected by its use is beginning to be more widely appreciated, due to educational advertising.

As a filtering, clarifying and decolorizing agent, diatomaceous earth is used extensively in the preparation for market of sugar, oils of many kinds, coal tar, gas, acid, color, wine, beer, fruit juices, adhesives, alcoholic extracts, dyestuffs, chemicals, glycerine, liquid soap, metallurgical solutions, pharmaceuticals, shellac and varnish and in the tanning and other industries.

The material is used in the insulation of steam and water pipes, boilers, ovens, oil tanks, fireless cookers, kilns, evaporators, stills, safes and refrigerators.

As a building material, diatomaceous earth is used in blocks, pulverized or compounded. It is employed between the walls and floors of buildings for insulation, to prevent the formation of fungus and dry rot and to keep out rats, mice, ants and all kinds of vermin. It is used in the formation of compounds in bricks, tile, artificial stone, concrete resistant to salt water, plaster and patent floor covering, and it may replace some of the lime in sand-lime mortar.

Filler Material

As a filler, diatomaceous earth is used in soft and hard rubber, phonograph records, sealing wax, match heads, the coating on match boxes, soaps, paint, paper, papier mache, oil-cloth, linoleum, curtain cloth, fireproofing, calcimine, roofing, drugs and in all kinds of plastics wherever a light, cheap inert filling agent is desired.

As an abrasive, the material is used as polishing and cleansing powder for metals, glass, furniture, enamel, bath tubs, sinks, finger nails, teeth, etc., and for polishing metal for microscopic examination.

Diatomaceous earth is used as an absorbent for liquid disinfectants, liquid manure, waste sulphite liquor and as a vehicle for holding oxides of nickel and other metals for catalysts.

As a chemical reagent, the material is employed in the manufacture of sodium silicate, and as a body for ultramarine, aniline and alizarine colors and for casein glue and of pure silica.

Packing Material

Diatomaceous earth is used as packing material around glass containers for shipping acids and other reagents that will cause combustion on contact with hydrous carbonaceous matter. It is used as a constituent of porcelain, cements, fireworks, blackboard crayons, fertilizers, porous chemical ware, almond meal, tile glazes, dusting powder.

Some Principles of Quarry Operation and Crushed Stone Production

II—Improving Existing Operations

By Loyd Wilson
Consulting Engineer, Detroit, Mich.

THOSE OF US already in the quarry business are finding that competition is constantly becoming keener all around us, and it is becoming necessary to reduce costs as much as possible and to improve our product and our service. The day of guesswork and snap judgment is passing in all industries, and there should no longer be room for them in the quarry industry.

Keeping of Records

The process of quarrying, crushing, and merchandising stone is like a chain, no stronger than its weakest link. If there is an interruption at any one point, the whole process is immediately affected. A shovel will break down and the amount of stone delivered at the mill will be entirely stopped, or the amount of stone delivered will be reduced according to whether or not more than one shovel is operated. If there is a breakdown in the mill, all of the shovels will suffer delays unless there are storage tracks for loaded and empty cars. Even in this case, as soon as all available empty cars have been loaded, the digging in the quarry must stop, not only until the mill starts running again, but until empty cars have been hauled back to the shovels.

We can easily determine the weak spots in this chain by keeping intelligent records of our operations. Suppose we station a man at the crusher, supply him with printed forms, and have him take down the time of each car as it is dumped. From information reported to him by the foreman, have him note all delays and the reason for each. From these daily sheets we can make a table on a single sheet that will show the various causes of delay, the amount of time lost due to each cause, for each day, and the total amount lost for the month. This sheet will show us at a glance whether our troubles are traceable to the quarry or to the mill, and, if to the mill, just what part of it is at fault.

If we find that considerable time is lost because there is no stone at the mill to be crushed, we know that it is because the quarry operation or the transportation to the mill is faulty. In this case let us carry our tests a little further and time the loading of trains and note the delays in loading and the amount of delay attributable to each cause. We can tell from a study of these records whether our troubles are due to the transportation to the mill or to the loading, and if due to the loading, the amount of delay to be charged to various causes affecting it.

The results that we obtain may surprise us greatly. We may, from our long experience around the quarry and mill, have a general idea of the causes of our troubles, but there is nothing like having a complete diagnosis of them all down before us in black and white.

Some Delays Are Unavoidable

There is always going to be more or less delay in any quarrying and crushing operation. The delay due to the quarry can be reduced by having a shovel and transporting capacity largely in excess of the amount normally required; but that is not economical as it requires not only an excess investment for equipment, but also an excess of labor to operate the extra equipment. The mill delays can also be reduced by having a large excess capacity. This is much more justifiable than too great an excess of quarry capacity, for in the first place it necessitates merely a larger investment and possibly a little more expense for power, but does not necessitate but little, if any, more labor. In the second place, mill delays are more important than quarry delays because they delay the entire loading and transporting operations, and these operations usually require considerably more labor than the mill. In the quarry, if more than one shovel is operated, a breakdown to any one is only local and does not affect the others.

An operation that has a very small percentage of delays does not necessarily indicate excellent management, on the contrary it may mean too great an amount of equipment being operated for the production obtained. To say that any particular percentage of delay is absolutely economically correct would be impossible, as each quarry is a separate problem and must be treated as such.

An operation where the stone is hauled to the crusher direct without any storage tracks for loaded and empty cars will show more time lost because of there being no stone to crush than one where there is such a storage. Yet in some cases collecting yards are considered a nuisance, for they require the uncoupling and coupling of cars and the necessary additional labor for performing these operations. The plant that has a mill capacity great enough to take care of cars as quickly as they come to it, even though there is a considerable amount of time when there is no stone for it to crush, may be more economical than one with less mill capacity, and shows considerably fewer quarry delays. Another operation may show a considerable amount of delays, and yet be able to produce all the stone that it can market, so that there would be no benefit obtained by spending money to cut down the delays and increase the production. In some cases, however, increased production may enable us to reduce the working hours if they are not already so low that they cannot be reduced still further and yet hold the necessary labor. Other operations may have an intermittent demand for their product which will necessitate their holding on to labor at times when it is not economical to do so in order to have it when they are rushed.

These records can only show us definitely where our troubles are. However, if we go to the expense of making such records, we should go still further and figure carefully the cost of making changes or improvements that our studies indicate to be advisable, also estimate carefully the benefits that we might expect to derive from these changes and improvements, for an off-hand guess may easily lead us astray.

Danger of an Off-Hand Guess

The writer knows of a comparatively large quarrying operation where standard 100-ton shovels are used and where they load into low mining cars of about five tons capacity. It was believed that the use of larger cars, such as those of from 10-yd. to 12-yd. capacity, would increase the output of the shovels 30%. Some cars of 30 tons capacity had been tried out in this quarry on stripping operations, and it was found from records taken of the time of loading that the shovels could load the same amount of material into these large cars in approximately 25% less time than was required for them to load it into the small 5-ton cars. This meant that in the same amount of time the shovels would load 33⅓% more stone when large cars were used than when small cars were used. From this information it might appear that the amount of stone dug by the shovels would

be increased at least 30% by use of large cars.

As we analyze this problem further, however, and put it down on paper we find the actual case to be somewhat different. We start out with the established fact that while the shovels are actually loading, they will load, say, 33⅓% more stone if large cars are used than if small ones are used; but we all well know that shovels do not spend 100% of their operating hours in loading. There is time lost due to various causes, and even if the amount of stone loaded is increased, have we any reason to believe that this lost time will not also be increased in a similar proportion so that actual loading time will be reduced? If the shovels are now delayed a certain amount of time each day for drilling and blasting in front of them, this amount will be increased as the amount of stone dug is increased. The lost time caused by breakdowns will be increased very nearly in direct proportion to the increase in the amount of stone dug, for it is usually the overstrain due to the digging that causes these breakdowns. If more stone is loaded, more train loads will be hauled away and the amount of time lost because no empty cars are available for loading will be increased proportionally.

According to the writer's memory, the average loading time of the shovels in the case now being considered was about 65% of the total operating time, while the idle time due to delays was about 35%. This percentage of idle time was probably greater than in the average quarry because of an uneven quarry floor and other unfavorable conditions.

However, using these figures and 33⅓% as the increase in efficiency of the loading on account of the use of larger cars, we would have a net increase in the amount of stone loaded of 19.4%, or only a little over a half of the amount that a rough guess would have led us to expect.

Applying Mathematics to Quarry Problem

The writer does not wish to gain the reputation of being one who would advise routing quarry trains only by algebraic formulas, but for the benefit of any who may desire to check this statement, he submits the following:

Let x = the net percentage of increase in amount of stone loaded due to the use of large cars.

Using small cars, loading time = 65%; idle time = 35%.

Large cars, loading time = $(65 - 35x)$ %.

Amount of stone loaded when small cars are used = 65.

Amount of stone loaded when large cars are used = $(65 - 35x)1\frac{1}{3}$.

$$\frac{(65 - 35x)1\frac{1}{3} - 65}{65} = x$$

$$86.67 - 46.67x - 65 = 65x$$

$$21.67 = 111.67x$$

$$x = \frac{21.67}{111.67} = 19.4\%$$

Using small cars, loading time = 65%; idle time ..... = 35.00%

Using large cars, loading time = 65 − (35 × 19.4) ..... = 58.21%

Amount loaded when large cars are used = (58.21)1⅓ ..... = 77.61%

Amount loaded when small cars are used ..... = 65.00%

Increase in amount loaded due to use of large cars ..... = 12.61%

Percentage of increase in amount loaded due to use of large cars = $\left(\frac{12.61}{65}\right)$% = 19.4 %

It was found in this case that the increase in efficiency of shovel operations that would have been obtained by the use of larger cars would not be sufficient to permit the complete elimination of one shovel. Consequently the only advantage to be gained was a reduction in operating hours, and after figuring the benefits in dollars and cents they were found to be insufficient to warrant the necessary investment for equipping the quarry with larger cars.

Another circumstance which entered into this case was the fact that the primary crusher at this quarry was a gyratory. Considerable delay occurred at this crusher on account of the arching of large stones. It was believed probable that if the amount of stone dumped into this crusher at one time was doubled, or trebled, that the delays due to arching would be very greatly increased, and that an apron feeder would have to be installed to prevent them from becoming excessive, and this would have added considerably more to the investment necessary in order to use large cars.

We should always look carefully to make sure that when we adjust a trouble at one point in our process we are not adding trouble at another point. We should also look carefully, when increasing the capacity of a certain portion of our plant, to make sure that there is not some other portion farther on in the process, which may not show up in records as a matter of importance, but which may be of only slightly greater capacity than the one that we increase. It may develop into a limiting feature that will prevent us from deriving the full benefits that we expect to gain from our investment.

Other Expenses To Be Watched

There are, of course, other expenses in connection with the quarrying and crushing of stone aside from the digging, transportation and mill operations, where there may be chances to save both labor and materials. Most of these expenses, aside from general expenses such as taxes, depreciation, etc., would be included under the following headings:

Stripping, drilling, blasting, maintenance and repairs.

They are important, but they are not tied up as a link in the chain with the digging and mill operations and are, therefore, subjects for separate study.

An occasional check on the loading time of stripping shovels would do no harm, and might help to determine whether or not they were working up to their proper capacity.

The spacing of drill holes and the kind and amount of powder used are of great importance. The powder cost usually is the most important item of expense for materials in a quarry operation, and we all know how improper drilling and blasting can affect the digging of stone, and in turn affect the entire production. Expert advice on this subject, if desired, can be obtained from technical representatives of powder manufacturers who have specialized in this particular line.

The cost of maintenance and repairs has no effect on production, but the extent to which they are carried out or rather not carried out may have, and the necessity for more attention in this respect may at times be shown up clearly by records of the quarry and mill operations.

Improvements to Product and Service to Customers

Additional, or more efficient, screening equipment or possibly equipment for washing the stone, when water is available in sufficient quantities, may prove advisable in order to improve our product. In this connection it may be said that the washing of stone is frequently considered as an unwarranted expense, whereas it may prove in some cases an actual economy, aside from the advantages to be gained from a better product. The screening capacity of a plant may be increased materially by the addition of water, also the amount of stone which must be sold at a cheaper rate, as screenings, may be decreased.

Dependability of shipments may also be a factor in deciding from whom to buy stone and anything done to increase this dependability such as increased storage facilities, if this can be provided at a reasonable expense, may help to increase sales.

What is desired is a well balanced operation that will give us the greatest return on our investment, and in the writer's opinion, this problem can best be solved by records designed where possible to show us definitely where our weak spots are, and then by figuring carefully in black and white the best means of curing these troubles.

Lubrication of Coal Pulverizing Equipment

THE March number of *Lubrication*, published by the Texas Co., New York, contains information on lubrication of coal pulverizing machinery which is very useful to cement and lime manufacturers as well as other rock products industries that use pulverized coal in any quantities. It contains many illustrations of typical equipment such as crushers, pulverizers, feed systems, mechanical stokers, etc., with instructions on the method of lubrication and the type of lubricant to be used with each.

Quarrying Gypsum in the Colorado Desert

Summer Working Hours Are 4 A. M. to 1 P. M.—Thermometers Are Barred from Camp Where Temperatures Reach 148 Degrees

By George B. Bowers
San Diego, Calif.

THE GYPSUM DEPOSITS of the west slope of Fish Mountain near the western border of the Colorado desert, which have been described in previous issues of ROCK PRODUCTS, are said to be the largest known of the world, and exceeded in purity only by those of Nova Scotia. They cover many square miles and the gypsum is entirely exposed. The deposit, now being operated by the Pacific Portland Cement Co., Consolidated, covers over five square miles and is one of the three largest. The existence of this and the other deposits has been known for many years, but profitable exploitation commenced about a year ago, shortly after the present owners took charge.

Transportation Problems

Transportation was the big problem and it was solved by building a railroad 26 miles long, from the quarry to Plaster City on the San Diego and Arizona railroad, where the company has erected a plant. Many difficulties had to be overcome before the railroad became dependable. Moving sand dunes have always been a menace, and probably will always be so. Popular imagination has it that there are no rains on the desert, but destructive floods are common around Fish Mountain. A desert flood is erratic. It cuts a new channel, however slight the obstruction. A clump of grass, a brush, a slide of sand, or a drift may turn a desert stream out of its old channel, which may have been bridged with expensive structures. The quarry railroad will eventually be completely protected by clay dikes. The October rains of last year carried away 800 ft. of roadbed. Temporary barriers of brush have since been erected to prevent a recurrence of the washout, and to serve until clay dikes can be built to replace them. This work is to be carried on as rapidly as possible.

The gypsum quarry has no engineering problems of importance to be solved. The few operations were briefly explained by Superintendent Thomas as follows:

No Stripping Necessary

"Operation here is extremely simple. You see our track runs the full length of the face of the quarry. The cars are loaded by a steam shovel. This is, indeed, easy and entails little hand labor. Any large pieces of rock escaping the jackhammer along the face of the cliff are broken up on the car. That is about all there is to it. Loaded cars are sent down to Plaster City whenever there are enough for a trip.

"To loosen the rock we drill a line of shallow holes with a pneumatic drill to secure, by means of a small blast, material for the major operation to follow and an easy road for a well drill. We drill a series of 4-in. holes 8 ft. apart, about 30 or 40 ft. from the face of the quarry. Our deepest hole has been 80 ft., where we encounter the underlying clay.

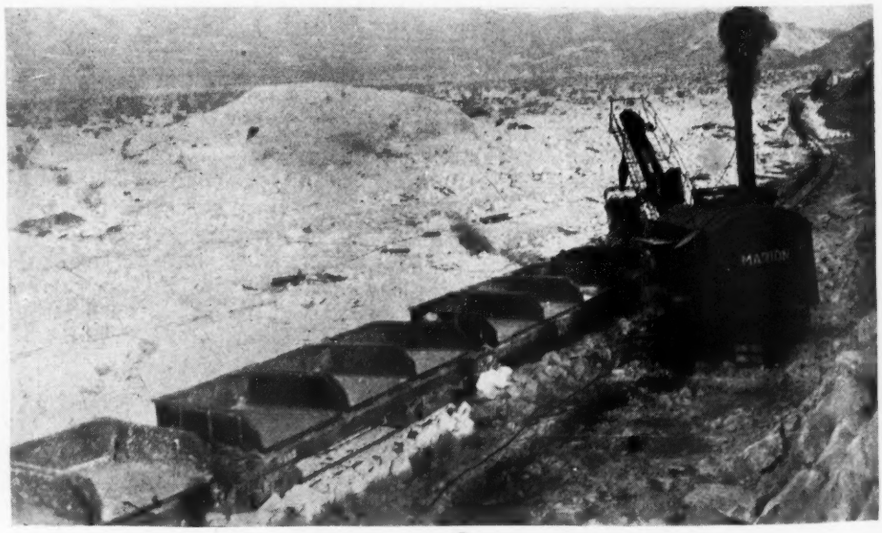
A series of blast holes are drilled about 30 to 40 ft. from the quarry face

"Into each hole I put eight sticks of powder for a preliminary shot to spring a cavity for the big load. For the final shot I fill the holes to within 10 ft. of the top. My last big blast took 17,000 lb. of powder, shattering 50,000 tons of rock.

"All the mining is done by Mexicans; the machinery is operated by Americans. The labor turnover is practically nothing. We furnish the men meals, for which the company is reimbursed. The food is wholesome and abundant, as you have seen during your two days with us. You have been served the same kind of food as the laborers. Good food keeps the men satisfied.

Operating at a Temperature of 148 Deg.

"We operated through the entire summer of last year. The hours were from 4 a.m. to 1 p.m. Some days the thermometer went up to 148 deg. F. The men suffered little. During the summer I enforced one rule: only one thermometer was permitted in camp, located in my quarters out of sight.



Shovel loading gypsum on cars running on track along full length of quarry face

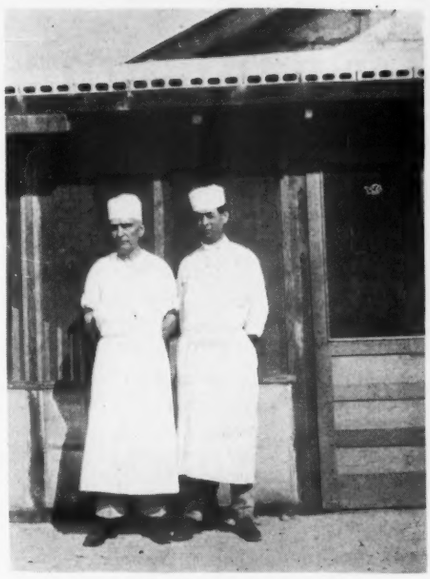
Suffering from heat is aggravated through the presence of tell-tale thermometers, a good reason for barring them from camp.

"Coming back to our quarry, we have no rock less than 92% gypsum, and some of it comes out over 99% pure. I believe I am safe in saying that the only gypsum rock in the world, excelling ours in purity, is that of Nova Scotia.

Blasting Problem

"My big problem here is the rock's resistance to blasting. The rock does not shatter satisfactorily. There is too much jackhammer work required to prepare the rock for the mill. That is my only serious problem. I have tried the various brands of powder, and a number of experts have given me advice, but without satisfactory result.

"Possible production here is almost unlimited. We have enough rock for centuries. Our transportation is relatively cheap now that our railroad is undergoing constant and permanent improvement. The grade favors the factory terminus.



The cooks—a good reason for a small labor turnover

Superintendent Thomas standing in the doorway of his quarters

Rate of Solution and Availability of Commercial Limes*

RECENTLY experiments were carried out at the Massachusetts Institute of Technology on high calcium and magnesium limes in order to standardize and improve the qualities of these limes. In order to do this it was necessary to obtain greater knowledge of the chemical reactions of the limes and their properties which influence these reactions. The effects of different solvents on the rate of solution and availability of the alkali were observed.

The result of this work can be summarized as follows:

1. The availability of a commercial lime in general depends on the rate of solution which in turn is dependent on the fineness of the lime and directly proportional to the area and the ultimate solubility of the lime. In other words, if the size of lime particles is halved, the area exposed is doubled and the consequent rate of solution is doubled. In the case of high calcium limes some of the lime dissolves to form calcium hydroxide which penetrates into the particle through the pores and reacts with the lime (calcium oxide), causing swelling within the particle and liberating heat and consequent rupture. This causes an increase in the area of the solid and more rapid rate of solution.

2. When the lime reacts with an acid that forms a soluble lime salt, the rate of solution is increased, the increase over the rate in water being directly proportional to the concentration of the acid. If the lime reacts with an acid to form an insoluble salt, the particles of lime are crusted over with this insoluble coating and the rate of the solution is decreased. In the case of lime reacting with salts with the production of an insoluble salt, the rate of solution is decreased still further.

It is thus shown that for an availability test for lime to be of any value the test must be based on the particular process for which the lime is to be used. However, the method proposed by the experimenters is useful for the comparison of different limes in a particular process, in which cases the tests for availability must simulate the condition under which the lime is used.

*Abstract from *Industrial and Engineering Chemistry*, **18**, 19 (1925).

Measurement of Kiln Performance*

A FEW years ago a consulting engineer was asked to investigate a new type of lime kiln and determine its performance. He tested it carefully and reported a fuel ratio, as determined from direct weighing of fuel and product, of 5.2. His report also included complete data as to temperatures, gas analyses, and the like. On the basis of his recommendation, the kiln was installed in a second plant, which, however, was never able to realize an average fuel ratio of better than 4.0. Recent study of the original report shows that the engineer failed to use gas analyses to check the direct determination of the fuel ratio. The gas analyses of the original test show a ratio of only 3.8. It seems probable that the operator succeeded in having the test start with a kiln nearly full of burnt lime that was progressively worked out during the test, winding up with a kiln nearly full of stone. Had the engineer analyzed his own data, the incompatability of the results would have been obvious and the mistake avoided.

In order to find out just what can be expected from a kiln under certain conditions all factors such as fuel, air, heat distribution, stack loss, etc., must be considered and calculated. The experimenters made a study on a shaft kiln provided with a recirculation system and compared its behavior with a kiln without it. The following table shows the results obtained:

	Without	With
Lb. lime produced, per. hr.	2000	2000
Lb. lime, per lb. coal	2.68	2.78
Per cent excess air	52.8	(fixed) 20.0
Coal used, lb.	744	718
Mols gas thru lime, per lb. lime	0.23	0.21
Per cent stack gas recirculated	0.0	14.8
Cu. ft. stack gas recirculated, per hr.	0.0	47,400
Per cent lower heating value of coal lost up stack	17.0	14.1
Per cent lower heating value of coal in sens. ht. of lime	1.5	1.5
Per cent lower heating value of coal used to decompose lime	26.8	27.8
Per cent lower heating value of coal to radiation, etc.	54.7	56.6
Per cent lower heating value liberated in furnace	100.0	45.0

From the results obtained it can readily be seen that the advantages of the Eldred-Dougherty recirculation system lie, not in the fuel saved nor in lower costs of operation, but in the higher quality and greater uniformity of the product.

*Abstract from *Chem. and Met. Eng., 33 (1926), 2.*

Causes for Loss of Lime Production

More About the Human Factor—Competition Between Shifts—Practical vs. Scientific Men

By A. S. Deringer
Oak Harbor, Ohio

IN the preceding articles dealing with this subject I tried to show some of the causes responsible for the loss of production in lime plants that are directly attributable to the management.

To be sure, we recognize the fact that the entire oversight and management in the operation of any plant is directly a matter for the owner or some properly delegated executive to be responsible for.

What I want to make clear is that the points that have been discussed in previous articles are those that should come directly under the supervision of the man who is delegated to the management of any operation, especially a lime plant, and in which the human element plays a large part, but is not the all-important and deciding factor, since the executive has chosen or has mapped out a course or a routine for him to follow, or in failing to map out a course or a regular mode of procedure has allowed the employe to follow the course of least resistance that naturally offered itself.

By the neglect of proper foresight the executive has likely overlooked some essentials in the erection and construction of his plant that would be conducive of productive results, and because of his neglect lays the blame upon the man delegated by him to operate his plant for being unable to produce the expected or desired results.

Or he may have, for the same reason, failed to provide for the easiest and most economical method to operate his plant, thereby again bringing blame upon the man in charge of the plant, be he ever so faithful and painstaking in the discharge of his duties, for not producing better and more economical results.

After an executive has thus blundered, and he realizes his errors and is ready to correct them, and in so doing is willing to enter into a spirit of fairness and co-operation with the employe in an effort to retrieve some of his losses, he will invariably find the employe with him 100%. But if by a display of "I-know-it-all" attitude he tries to revise or correct his errors, and in a way tries to revolutionize his business to increase his output, perfect his product to a higher standard and to decrease his costs of production, he will more than likely find the sledding pretty rough and not often to his liking.

We find human nature pretty much the same in all walks and phases of life, and we will be just as certain of finding the employe interested in any effort that will be of benefit to his employer, if he is taken into the employer's confidence as man to man in the scheme of working out beneficial improvements. I have yet failed to see the employe who, if properly treated and acquainted with the objects in mind, did not respond whole-heartedly, and whose interest and enthusiasm in the project and in the results surpassed even that of the executive, or in the case of failure his disappointment was more perceptible than that of his employer.

I do not want to be misunderstood. I do not mean that you must take the employe into your confidence concerning all phases and angles of your business, but in so far as your business and his work are correlated, I think the practice would find a hearty and beneficial response.

In all the armies of industry there must be a general to direct, to issue orders and commands; and there must be those to dispatch and execute those orders and commands to successfully carry on any important undertaking.

But we invariably find that the general getting best results and most admired and respected is one who has a kindly feeling for those in the ranks, who is considerate of his inferiors in rank, and who does not place himself on a higher self-made plane because of the fact that he is privileged to exercise those prerogatives.

Right here and now let me add that an executive does not want to allow his feelings and his leniency to run rampant to a degree that will make him a weak, flabby, spineless leader, for that will lose him the admiration and respect of his employes. An executive may be ever so stern and harsh, even to a point of being severe, but he can if his actions are tempered with fairness and a feeling of justice command the respect and admiration of his employes.

This leads us to several more causes for the loss of production in lime plants that are attributable to the men in the ranks, to the actual performers, to those without whom industries could not exist, and because they lack the right spirit or consideration for their employer, either take advantage of him or are in a revengeful spirit for suspected wrongs or injustices inflicted by the employer.

Co-operation Rather Than Competition Between Shifts

Now in order to obtain the best possible results from a lime kiln it is necessary after all the other reasons that have been discussed have been remedied, that there be maintained a constant uniform temperature in order that each draw have as nearly as possible the same amount of lime.

It is true, however, that climatic conditions will cause variations in the amount of lime produced, even though the kilns be subjected to a uniform temperature and all other conditions for maximum production are ideal.

A good many lime plants operate only a single or daylight shift. That is, the crew that disposes of the burned lime, as a rule, works only during the daytime. This shift as well as those directly engaged in the burning of lime usually has ample supervision, when the operation goes along with clock-like precision, but during the "off" or night shift when there is no supervision, we usually find the greatest variation in output, because of carelessness oftentimes on the part of the firemen in not maintaining a uniform temperature.

Now in connection with maintaining a uniform temperature, and in order to insure a good substantial output at all times, other conditions being equal, it is necessary to draw the kilns to a point that will yield the most lime at each draw and at the same time have no overburned or underburned lime.

One of the big troubles in lime plants is a lack of proper interest on the part of the employe at night, when there is no supervision, to exercise sufficient care in seeing that the proper temperature is maintained, and that the kilns are drawn in a manner to be productive of the best results.

A lot of employers also make the mistake of allowing inexperienced men to work in the night shifts.

There is also another evil that creeps into the operation of a lime plant, which if allowed to continue for any length of time will seriously impair the output both as to quantity and quality.

I refer here to the practice of "racing." By this I mean one shift trying to produce more lime than the other.

Now, Mr. Operator, don't flatter yourself when you find this practice prevalent in

your plant, and think that by the spirit of friendly rivalry in your plant you are going to be the winner, because you are not, and if you permit it to go on you are due to receive a severe jolt. Because, when a lime kiln is properly operated—well, it just can't be done! For as soon as one shift draws more than its normal amount of lime, the following shift simply loses that much more and in addition has a lot of underburned lime.

A good many plants no doubt have a good dependable force of men on the "off" or night shift, who have the interests of their employer at heart, and who put forth their best efforts to see that the employer's interests are not jeopardized, but where that spirit is lacking the operator will find that supervision is not an added expense.

Someone has suggested placing the firemen and drawmen on a tonnage basis, and if one shift overdraws or ruins the chances for the following shift, to penalize the guilty ones. That practice would be all right for settling the differences between the two shifts, but who is going to reimburse the operator for his loss in production brought about by this practice?

Here, again, while these problems are directly attributable to the employe, it again falls to the lot of every operator to keep an ever watchful eye on his operation, and try to win his men over to him so that his interests will be their paramount aim in doing the tasks for which he employs them.

Right here, we find that self-same axiom confronting us again, "That you can't hope to get something for nothing"—especially in a lime plant. Unless you exercise constant vigilance to see that your kilns are kept continually filled to the top with a clean, uniform-sized stone, and unless you see that an even, uniform temperature is continually maintained, you are going to be a serious loser; or, if you are derelict in your supervision and allow these conditions to continue because they are more or less an existing evil that is difficult and costly to overcome, and attempt to revolutionize the mode of your operation in order to make it more productive and more economical, you will be the loser.

Let us be very conservative in arriving at the results that can be obtained by being a little painstaking and adhering to the remedies suggested, in this and preceding articles relative to the operation of lime plants, and by not taking existing conditions for granted and feeling that they are thus and cannot be altered.

Relative Costs

How much will it increase the cost of a ton of lime to keep your kilns continually filled to the top, if thereby you increase your output one-half ton per kiln per day? You will naturally say there is no increase in the cost of your lime. Then isn't it worth your time and energy to see to it that they be kept that way?

Before I proceed I want everyone who reads this article and is interested enough to want to compute his own saving, to do so, as I cannot set a standard and have it compare favorably with others under a variety of conditions and localities.

How much will it increase the cost per ton of lime if you were to charge your kilns with a uniform grade of clean stone that would permit of ideal calcining conditions, if thereby you increase your lime tonnage from one to two tons per kiln per day? In some operations that I have witnessed I would say that even these amounts can be greatly increased, if not doubled.

Now let us assume that a plant has all the modern appliances for handling the lime after it leaves the kilns so that the increased production will not add to the labor cost in the lime plant, and that the interest and depreciation charge on the added scalping equipment is taken care of by the scalped product, which is turned into commercial products. Then your additional lime tonnage is so much velvet and surely has warranted the investment.

EVERY lime plant superintendent has his own ideas about the efficiency or inefficiency of lime burning as practiced. Let's come out with them! We would all like to extend this discussion.—The Editors.

On the other hand, where stone is produced by the hand method, let us assume the cost has increased 10 cents per ton because more care must be exercised in its selection, that it must be broken smaller and all be hand-picked and not forked or shoveled. This will naturally increase the cost of your lime 20 cents per ton.

Now if we can increase our kiln output only one ton per day, or bring the production per kiln from eight to nine tons per day at an added cost of $1.80 per day, and if your lime has a value of $7 per ton, you have increased your earnings for one kiln by the change to this operation $5.20. Not so bad.

Before I finish with this analysis I hope to prove to you that your actual cost per ton of lime has decreased considerably notwithstanding the fact that you have invested in additional equipment, and even if you charge interest and depreciation on this equipment against your lime cost; and for stone quarried by the hand method even if it has increased the cost of selection as much as 10 cents per ton.

Let me assume now that you have decided after tests have proved to you that it is best, to keep your kilns filled with the best possible grade of uniform size stone, and you have altered conditions in your kiln furnaces to permit of as ideal combustion conditions as is possible to obtain, that you are able to regulate the draft in the kilns to obtain the best possible uniform temperature in your kilns at all times, and that your kilns are drawn to permit of the maximum output being obtained. Now after you have put all the foregoing into practice you find that in addition to the other improvements you have increased your fuel ratio, let us say from 3 to 1, to 3½ to 1. Don't you think your effort was worth while?

To this saving let us not forget to add the saving in labor that will naturally follow. In most plants, in fact in all of them, unless the labor cost is computed on the tonnage basis, there would be no additional labor cost, as the increased tonnage would only be a slight additional burden, especially where mechanical means of handling the lime are employed.

Then to this must be added the difference in the life of the kiln. I tried to make plain in a previous article that a lime kiln operated under ideal conditions will have longer life than one that is abused by trying to get results under wholly unfavorable conditions.

From the conclusions that have been arrived at I think that every lime plant operator will agree with me that if the mode or method of operating his plant is carried out in a manner to conform to the outlines as presented in these several articles, he will experience much greater returns than he thought his plant was capable of producing.

Lime Burning Not Mysterious

After all, the method of burning lime is not a mysterious one from which operators should shrink or shirk for fear of being overwhelmed by some mysterious element that is entirely foreign to anything they ever undertook.

Neither is it necessary to be scientifically trained in order to be a successful lime producer. Hundreds of old-time successful lime men haven't the slightest scientific knowledge of the process of producing lime. But they have volumes of good, sound, practical knowledge that has enabled them to make a success of their venture.

Oh! I haven't anything against a scientific operator so long as he combines his scientific knoweldge with good sound commonsense, practical applications and not entirely by rule of book, because this is one operation that requires the application of good common-sense, and a willingness and disposition to put it into practice.

There are to be sure scientific methods that enter into the operation of a lime plant, but these scientific principles are usually worked out by competent engineers or men who have a technical training and are best suited therefor.

We have learned by the discussion of the various phases in the process of lime making that there are a good many angles to it that require your earnest attention, just as there are in every other line of endeavor, and first and foremost among them is the angle that concerns the human element—the men in the ranks that make your enterprise possible. Let me urge you not to overlook or neglect them, and thereby and therefrom glean a lot of useful information and knowledge that will be of inestimable value.

Mining Florida Land Pebble Phosphate

Methods of Preparation Have Application in Other Rock Products Industries

By J. R. Thoenen
Mining Engineer, Greenville, Ohio

LAND PEBBLE PHOSPHATE is found and mined from an area approximately 30 miles north and south and 15 miles east and west situated in the west central portion of the peninsula in Polk, De Soto and Hillboro counties. E. H. Sellards in the seventh annual report of the Florida State Geological Survey summarizes the early geology of the state with particular regard to the formation of the pebble phosphate deposits as follows:

"During the late Oligocene time there accumulated over a part of Florida the great phosphatic marl known to the miners of pebble phosphate as the 'bed rock.' The phosphate in this marl existed in the form of pebbles of various sizes, shapes, and colors, and probably also as soft, or finely divided phosphate. Following the deposition of this marl a very large part of Florida became dry land. The marls were thus subjected to surface erosion, by which the top surface came to present the irregularities characteristic of and common to exposed land surfaces. This period of emergence and erosion continued apparently during the greater part, if not all of the Miocene period. Near the close of the Miocene or early in the Pliocene came a period of submergence permitting the sea to cover large areas of Florida that had previously been dry land. In connection with and following this Pliocene submergence the Bone Valley formation was accumulated, the first or lowest member of which holds the land pebble phosphates."

Deposits Regularly Distributed

Unlike the irregular deposits of the hard rock phosphates the land pebble deposits are fairly regular over large areas and since the pebbles seldom exceed 1-in. in diameter prospecting by dirt auger is feasible and quite accurate. From 16 to 20 auger holes are bored in an area of approximately 40 acres and from the borings the thickness and character of the overburden as well as the thickness and character of the phosphate beds are determined. By collecting, washing and screening the material taken from the phosphate bed by the auger the approximate tonnage and quality of the deposit can be determined.

Overburden consists principally of loose fine grained sand with occasional lumps of sand rock, and ranges from 3 ft. to over 30 ft. in depth. The phosphate beds range in thickness from 5 to 20 ft. and probably average about 12 ft.

In starting operations the washing plant

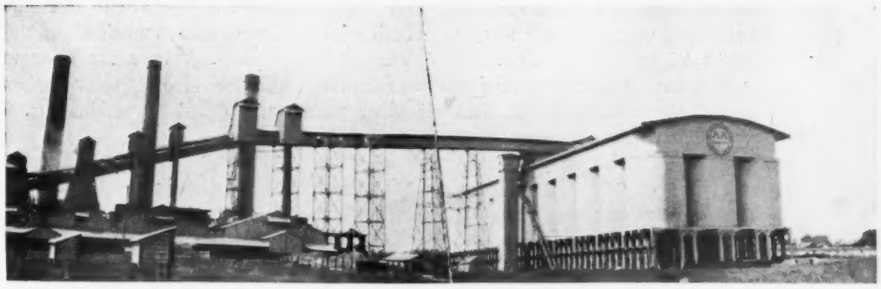
Stripping overburden by hydraulicking at the American Agricultural Chemical Co.

Stripped phosphate deposit at the American Agricultural Chemical Co.

Hydraulic mining of phosphate pebble in Florida

Washing pebble to the pump sump

is located in the center of four 40-acre tracts. The overburden is removed from one of these tracts by hydraulic giants and centrifugal pumps. The material is either sent to abandoned pits or stacked on the surface over barren ground. With the overburden removed from the first tract mining of the phosphatic matrix begins and the stripping operations are confined to the second 40-acre tract. Thus the location of the washer is permanent for at least the mining of 160 acres of ground and by the use of booster pumps for a much larger area.



General view of the drying plant and storage bins of the American Agricultural Chemical Co.

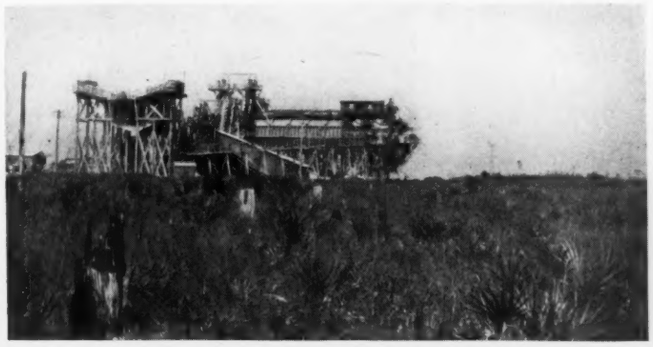
Removal of Overburden

In some cases the overburden is being removed by large dragline excavators. In this process the material from the first cut is piled alongside and as the phosphate is removed is scraped back into the empty pit together with that from the second cut. Dragline buckets up to 6- and 7-cu. yd. capacities are employed in these operations.

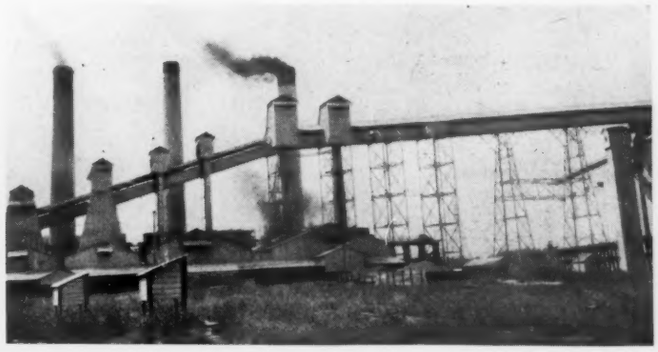
Water both for the removal of the overburden by hydraulicking and for the hydraulic mining of the phosphate is obtained from wells sunk into the underlying limestone, or from abandoned pits.

Three-stage centrifugal, or reciprocating pumps driven by steam or electricity, take their supply from abandoned or worked-out pits and force it through 10-in. flanged pipe reduced to 6-in. rubber hose at the giants or guns. Electric power is generated by steam turbines with Mexican oil as fuel.

Hydraulic guns are mounted on skids for easy mobility in the pits. In starting operations the gun washes out a hole for the pump suction in the underlying phosphate beds. The overburden breaks down easily and is carried to the pump suction through small ditches cut in the floor of the pit. Occasionally some blasting is necessary where sandrock is encountered. Accumulations of palmetto roots and other debris are



Washing plant of the American Agricultural Cehmical Co.



Conveyor system at the American Agricultural Chemical Co.

Conveyors for unloading wet rock and transfering to bins in drying plant at the International Agricultural Corp.

Pit wall showing phosphate and waste in a typical Florida pebble phosphate deposit

Pump suction below the phosphate bed into the marl or limestone for water for hydraulic operation

moved by hand from the face and left till the phosphate is mined when they are simply dropped into the pit behind the mining.

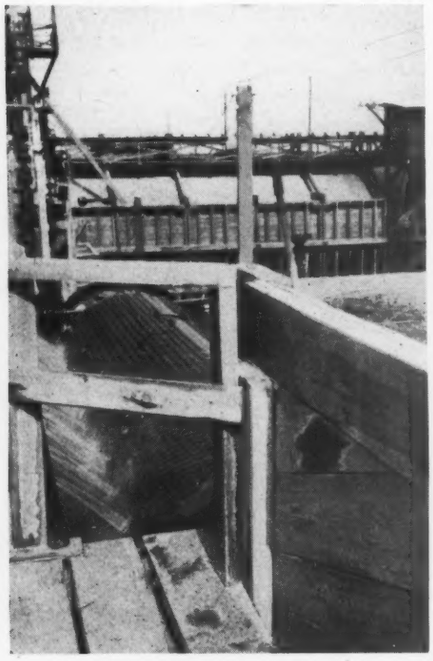
The same equipment is used for mining the phosphate and the process is identical except that the pump suction is now below the phosphate bed and in the marl or limestone. As the distance of the bank recedes from the pump suction small streams of water are taken from the supply line and wash the material through the ditches. Provision is made for raising and lowering the pump suction with a block and tackle and timber tripod in order to facilitate cleaning roots and other debris from the sumps. A single gun will account for approximately 50 to 75 cu. yd. of matrix per hour which when entering the pump sump forms about 10% of the volume handled. The action of this material through the long pipe lines to the washing plant tends to break up the clay balls and disintegrate the solids in preparation for the screening operation to come. Much of the clay is thus emulsified in the transportation process. Where the mine is considerable distance from the washer booster pumps are placed along the line.

Washing Practice

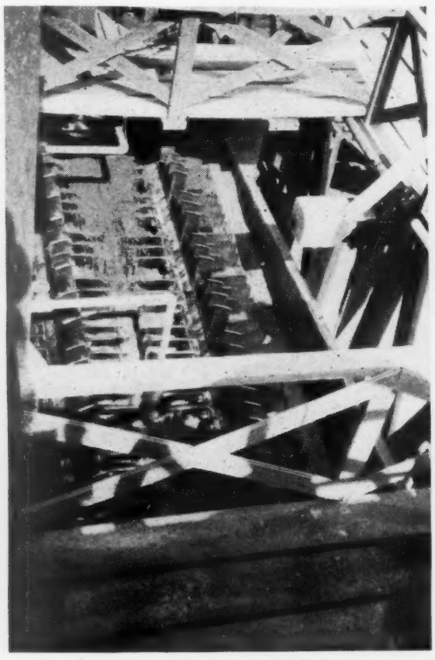
The product from the mine pumps enters the washing plant in a discharge box which spreads the material over a stationary slotted screen with 3/64-in. slots. This screen removes a large proportion of the fine sand and clay from the phosphate as well as the transporting water. Fresh water is added and flushes the phosphate over this screen to a 48-in. by 12-ft. cylindrical trommel or separator with 1¼-in. round perforations which removes the clay balls and other debris, oversize going to waste. Material passing the separator goes to a double log-washer and from that over a dewatering screen to a second double log-washer. Overflow carrying considerable fine sand and clay is sent to waste.

From the log washers the pebble is elevated and passed over vibrating screens on which a stream of fresh water is played. As the finer pebbles of this washed material usually are higher grade, the product from the vibrator screens is elevated to a second trommel or separator and the coarser rock removed and sent to the low-grade bins. The finer pebbles are picked up by a scraper conveyor and carried to wet loading bins for transportation to the drying plant. The grade of this material can be governed by the size of the perforations used on the final separator.

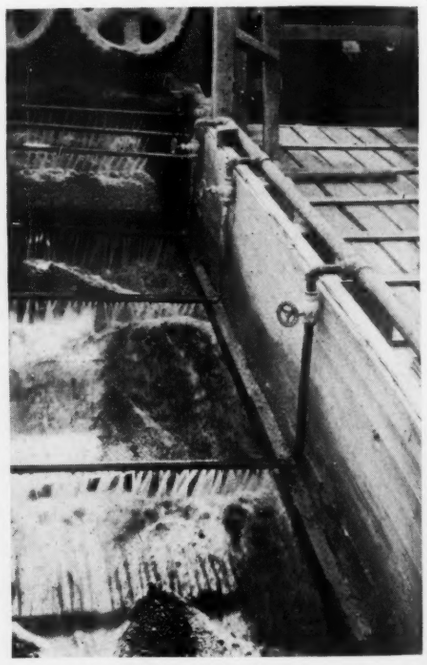
Attempts have been made and have given some promise of success in a further recovery by sending all the wash water formerly wasted to a settling box and rewashing the settlings from this box over an additional vibrator screen.



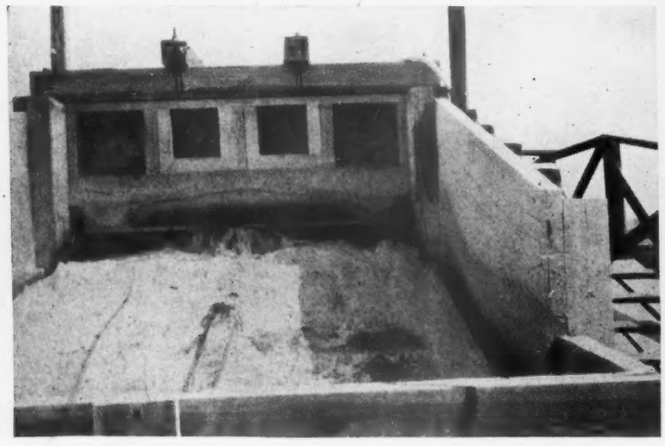
Cylindrical trommel with 1 1/4-in. perforations for removing clay balls



Double log washer which receives material from the trommel



Vibrator screens to which materials from log washer pass



Pump discharge box and stationary screen which removes much of the fine sand and clay

Vibrating screen on which material from the trommel is washed with fresh water

The whole process of preparation of the bank run material is really not one of washing so much as one of sizing. The clay must be eliminated and can most easily be done in the presence of water. The saving of the pebble phosphate rock is the object of the operation. In this saving considerable quantities of fine pebble are lost in the wash water as are also quantities of the soft rock or pulverized phosphate. There is no means of ascertaining just how great this loss is as no analyses are made of the phosphate content as the bank run material enters the washer.

Wet rock from the bins is hauled in 30-ton hopper bottom standard railway cars to the drying plant over tracks usually owned by the mining companies.

Drying Process

At the dryer the phosphate is dumped from trestles to storage bins or to pits under the track from which it is removed by elevators and sent to overhead bins. From the wet bins belt conveyors take the material to roll crushers to be broken to a uniform size or as in some cases the crusher is eliminated and the material fed direct to horizontal, revolving, direct-heat dryers of the Schoffield or Ruggles-Cole type, fired by oil. Material entering the dryers contains from 18% to 20% moisture unless there has been an intermediate drainage in stock piles in the open. After drying the moisture content has been reduced to from 2% to 3%. Dried phosphate is then elevated to a central conveyor belt and transported to the storage bins. These bins are of various types and of large capacity. Various grades are kept separate and the loading facilities are so arranged that either one grade only can be loaded in the car or material from various bins can be loaded simultaneously.

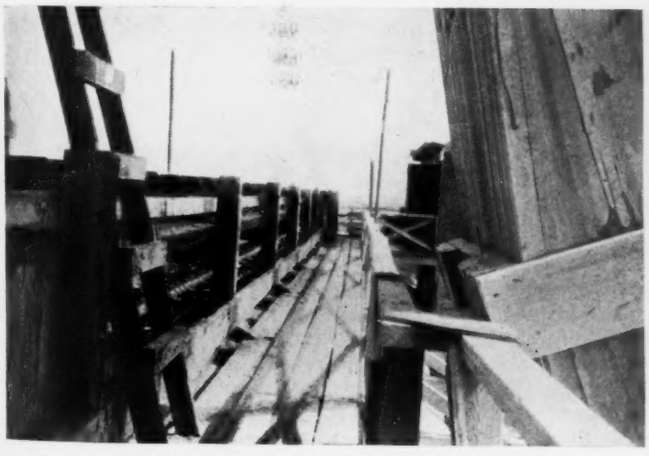
Wet phosphate rock entering drying plant

From these storage bins the phosphate is loaded into covered hopper bottom cars for shipment to the docks at Tampa and other ports or to the fertilizer works of the mining companies.

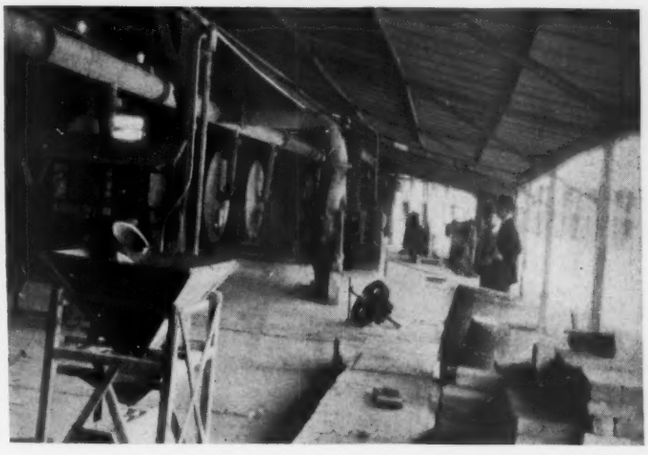
Status of Industry

The pebble phosphate field of Florida started shipping rock in 1891 and has for many years produced in excess of 2,000,000 tons annually. Originally opened by many small companies these have been gradually combined into a few large operating units resulting in many economies. The combined annual capacity of all plants is estimated to be in the neighborhood of 5,500,000 tons. Thirteen plants operating in 1923 produced something over 2,000,000 tons and last winter five of these plants were not operating, but the remaining eight are producing at the rate of 3,000,000 tons for 1925.

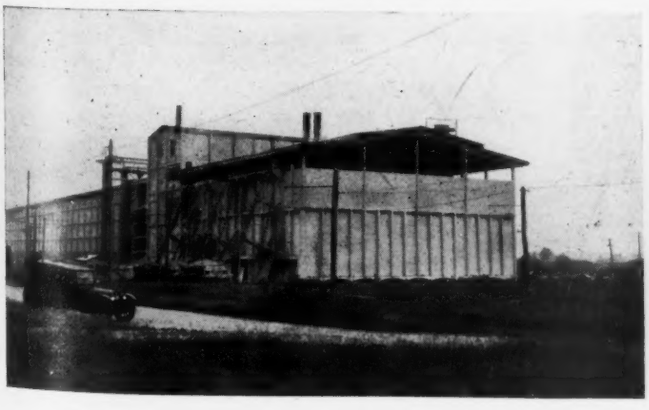
Various grades are manufactured depending on the bone phosphate of lime content. The higher grades are as a rule for foreign shipment while the lower grades are consumed locally. Considerable quantities are ground for application to soil without further treatment but the greater proportion is treated with sulphuric acid and thus converted to the acid phosphate.



Drag conveyor carrying phosphate pebble to drying plant

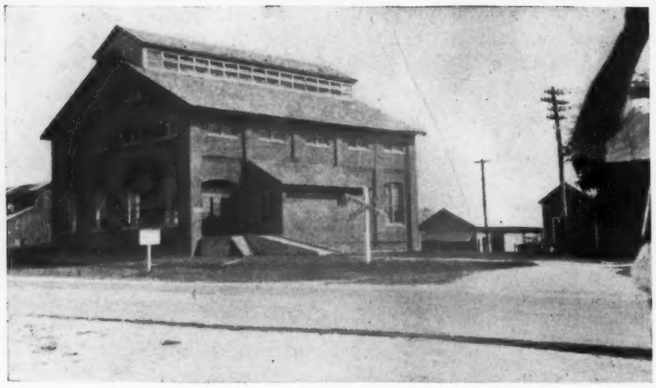


Horizontal rotary dryers of the direct-heat type

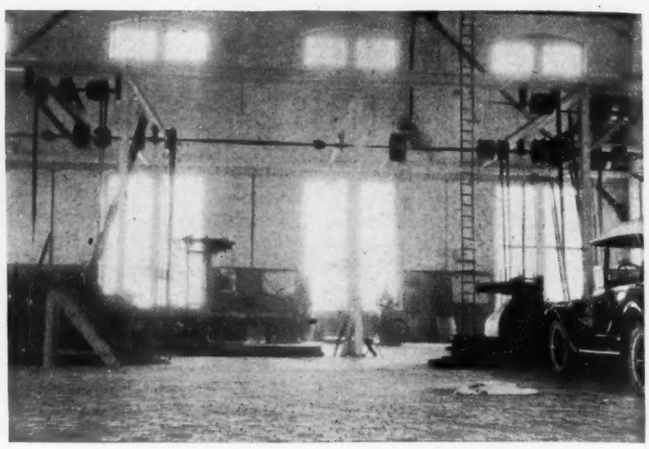


Drying plant of the International Agricultural Corp.

Commissary of the American Agricultural Chemical Co.



Machine shop of the American Agricultural Chemical Co., miners of Florida pebble phosphate



Machine shop interior

Wisconsin Agstone Producers

Form the Wisconsin Co-operative Agstone Association for Promotional Work

IN order to facilitate distribution and sales of agricultural limestone in Wisconsin and to promote the best uses of the product, several of the larger producers have formed an association known as the Wisconsin Co-operative Agstone Association, with headquarters at Madison, Wis. The original member companies are: The Mayville White Lime Works of Mayville, Waukesha Lime and Stone Co. of Waukesha, and the Wissota Sand and Gravel Co. of Eau Claire. Several other companies are making arrangements to join the association.

The officers and directors of the new association are president, H. M. Halverson, Waukesha, general manager of the Waukesha Lime and Stone Co.; vice-president, C. H. Rudebusch, president, Mayville White Lime Works; secretary, W. A. Rowe, president and general manager, Wissota Sand and Gravel Co., Eau Claire, Wis.; treasurer, R. C. Robertson of the Western Lime and Cement Co., Milwaukee; sales director, P. D. Southworth, former sales manager for the Wissota Sand and Gravel Co. of Eau Claire and former county agricultural agent for Chippewa county.

In commenting on the association, Mr. Halverson, the president, said:

"This past winter the demand for the product in Wisconsin was so great that the plants throughout the state were unable to anywhere near supply the demand. The production of agstone has been more or less a sideline—grinding up waste and screenings—no uniformity of product, no local service, nor attention to individual needs of each community—no economic distribution nor adequate attention to prices and freight rates.

"The principal producers through their meeting and co-operating with the state authorities, realize what must be done immediately to meet the situation. Up to the present there has been no uniformity of product—in many instances farmers have bought and paid freight on material that will do them little good. The Wisconsin Co-opeartive Agstone Association has one standard quality—fine ground, bone dry—no clay nor sand—the farmers pay no freight on water—it will all test 100% and will contain no coarse screenings.

"There will be a division of the state into zones—all prices will be made delivered; the same price in each zone and the farmers to get the benefit of the shortest haul and lowest freight rate.

"Distribution points will be installed at most railroad stations so that the industry will be put upon a commercial basis. It is the intention to make 'service' mean something more than catch-word. Each local agent will take orders, divide cars, care for shortages, look after collections, weigh and even where advisable will carry stocks.

"The experience of years, the good-will, the financial resources of the member companies will be pooled with the advice and helpful co-operation of the best agricultural interests of the state to further and make more economical the distribution of agstone, which is so essential to the prosperity of our dairy industry."

Grades of Lime Hydrate Made Under Different Conditions*

WHEN lime is hydrated slowly at low temperature, with excess water, the hydrate formed consists of very fine particles which are clustered together in lumps and settle rapidly in water. Excess water has three effects: it separates the individual crystals and decreases the tendency for agglomeration and growth of large crystals; it prevents local overheating of lime and its resulting disadvantages, and excess water at any definite uniform temperature increases the rate of hydration. Agitation produces a fine product and prevents formation of tight crystal clusters.

Increasing temperature when excess water is used increases the rate of hydration without a corresponding increase of the rate of crystal growth and decreases the tendency for crystals to agglomerate. Temperature increase with the theoretical amount of water or vapor has the opposite effect, for the heat of hydration is generated in a mass of such small heat capacity that overheating or "burning" results and a coarse inferior product made.

The reason for this is that this burning temperature is very close to the dehydrating temperature, and therefore the rate of hydration in any part of the mass which has been raised to such high temperatures will be very slow.

Completion of the reaction is then very slow since the lime must lose heat before hydration can continue. During this time the particles have a chance to grow in size and the final product is very coarse.

In the usual type of commercial hydrator the lime, with a slight excess of water, is fed into a system of cylinders and carried through by screw conveyers, being discharged as a hot, dry, powdered hydrate. Thus, although the lime is at first partially hydrated with excess water, this water rapidly changes to steam, and the remainder is hydrated by vapor. As has been shown, hydration with only a slight excess of water or with steam yields a relatively coarse product.

An elimination of the conditions which produce these effects would undoubtedly result in an improvement in the quality of most commercial hydrates.

The superiority of slaked lime properly prepared in a mortar box over commercial hydrate is due primarily to the large excess of water. It is probable that the average slaking operation employs an excess corresponding to five times the theoretical amount of water.

*Abstract from Ind. and Eng. Chem., 18 (1925) 120.

Limestones of Pennsylvania

Reviewed by Oliver Bowles

THE year 1925 seems to have been an open season for reports on limestone; first a report on Florida, then Illinois, then Wisconsin, and most recently the "Limestones of Pennsylvania," by Benjamin Le Roy Miller, professor of geology at Lehigh University. Professor Miller is a recognized authority on the non-metallic minerals of Pennsylvania, and as limestone is the most important of the non-metallics, not including fuels, in that state, the report is of more than ordinary interest.

The bulletin, which consists of 368 pages, 15 plates, 7 figures, and one map, is issued as Bulletin M-7 of the Pennsylvania Topographic and Geologic Survey, Harrisburg. The first 56 pages are devoted to a fairly complete consideration of the character, origin, and uses of limestone and dolomite. The chemical and mineralogical composition are fully described, also the organic and inorganic agencies that produce limestone. The uses include building stone, crushed and pulverized stone, furnace flux, cement, lime, furnace lining, magnesia manufacture, also agricultural and chemical applications. The great bulk of all the limestone produced in Pennsylvania is employed either for portland cement or lime manufacture, for furnace flux or as crushed stone. The portland cement industry in the Lehigh Valley is particularly noteworthy.

The report is geologic rather than technologic, practically no space being given to processes of quarrying, preparation or manufacture. Under geologic distribution it is pointed out that the limestones of value are confined to the southern two-thirds of the state exclusive of the anthracite and the eastern bituminous coal areas. A geologic time scale is given, and in a parallel column the limestones that occur in the various formations. The great bulk of the report, occupying over 280 pages, consists of descriptions of limestone occurrences on the basis of geologic formations, with counties as subheadings. One objection to this order of treatment is the necessity at times of scattering the data for a single county in widely separated parts of the report, a difficulty which is increased by absence of county names from the index. For the prospective quarryman an arrangement by counties, with subheadings for the geologic formations, would probably be more convenient, as it would assemble all the data on each county in one place. The present arrangement may be best for those interested primarily in the geology of the deposits, but the majority of users are more interested in geographic distribution than in geologic age.

Following the detailed descriptions of deposits the limestone resources are summarized, and the future prospects of the various branches of the industry discussed. The final section contains statistical tables of production of lime, limestones, and cement.

The report is well written and contains a wealth of information for the general reader, and particularly for those either directly or indirectly interested in the production or utilization of limestone or any of its numerous products. The increasing bibliography of comprehensive texts on limestone is evidence of the growing industrial importance of the carbonate rocks which may be regarded as indispensable in modern industry, and which have more varied uses than any other rocks or minerals in the earth's crust.

Testing Manual for Road Materials

SAMPLING AND TESTING OF HIGHWAY MATERIALS, by W. H. Barton, Jr.* and L. H. Doane.† Published by McGraw-Hill Book Co., Inc., N. Y., 1925. 355 pp. First edition.

THE book is an answer to a necessity for a publication which would satisfy the ever-increasing demand for knowledge of highway materials due to the rapidity of development of highway engineering as a science. The authors make no claim for originality of testing or grading methods, but offer it as compilation of the efforts and work of authorities on the different phases of the highway material testing. It is all that it is intended to be; a book from which students and beginners in the field can make their acquaintance with the literature and authorities and at the same time it contains the technical information and reference necessary for teachers and engineers.

The accepted practices in the testing of material from a laboratory standpoint are considered in detail. Emphasis is placed on the proper methods of keeping records and examples of the best forms are shown. The fitting of the laboratory and the care of the apparatus is considered. Correct sampling of material and methods of shipping properly are discussed. Stress is laid on the derivation of the true value of the materials from the test results of the sample.

Cement, concrete and brick play a great part in the modern road making of the present day. The book lists the definitions in common use which apply either to the materials themselves or their condition. Complete testing methods, both physical and chemical are described and the manipulation discussed. Apparatus, standards and methods are those adopted by the American Society for Testing Materials.

The chapter on aggregates is considered only from the point of suitability for use in highway construction. For detailed information on the geological and mineral aspect the reader is referred to an excellent bibliography prepared by the authors. Aggregates are classified according to recognized methods such as sizing, physical qualities and sources or origin and these again divided further and the general routine tests are applied. The methods of determination of the strengths of concrete made with different aggregates in various cement mixtures of varying qualities are shown. These also are the regular standard tests laid down by the A.S.T.M.

The subject of bituminous materials is so great that the book refers only to the regular routine tests made in practice. To assist the beginner a definition of the terms is given and for more detailed information on any phase, a reference bibliography is present. Here again, manipulation, equipment and standards are those set by the A.S.T.M.

There is given at the end a complete list of the specifications which have been drawn from reliable sources. These are for the purpose of furnishing the student or practitioner some standards to go by and are at best tentative. The charts, diagrams and tables shown are for interpretation of the tests performed.

*Assistant Professor Highway Engineering, University of Pennsylvania, formerly Highway Research Specialist, U. S. Bureau of Public Roads.

†Associate Professor of Civil Engineering, Pennsylvania Military Institute. Formerly Associate Professor of Civil Engineering, Clemson Agricultural College.

A French Book on Rock Crushing, Breaking and Grinding Machinery

TECHNOLOGIE DES CONCASSEURS, BROYEURS, ET TAMISEURS; Concasseurs a Machoires, Giratoires, a Roulis; Broyeurs a Cilindres, a Meules Verticals, a Frottement; Moulins a Pilons ou Bocards; Broyeurs a Percussion, a Anneau, a Boulets; Classement Volumetrique—Installations de Broyage, Appareils Auxiliares—Dispositions d'Ensemble. Par E. C. Blanc, Ingenieur, A.M. Avec 191 figures dans le texte. Libraire Polytechnique Ch. Beranger. Paris, 15, Rue des Saints-Peres; Liege, 8, Rue des Dominicians.

THIS is a book in French on types of crushing machines from primary breakers to the finest grinders. The fact that it is in French need not scare off anyone who has the ordinary college or even high school variety of French at his command, for it is written in a style that is easy to read, especially as the technical words are alike in both languages.

Mr. Blanc has by no means confined himself to the products of French manufacturers, but has given fully as much space to English and American machines. The American reader will recognize the greater part of the illustrations as pictures of machines with which he is quite familiar. The author has in several cases made comparisons of the machines used and the practice of different countries.

Nearly half the book is given to the theories of crushing and grinding and this is of course the most valuable part of the book to the reader who is interested in more than the mechanisms used to attain results. A reading of some of these portions has disclosed nothing that is particularly new. But they are good compilations and condensations of what has hitherto been published only in magazine articles and the like and Mr. Blanc has done the industries which are interested a valuable service in bringing this material together.

Hints and Helps for Superintendents

Work With Your Company Rather Than for It!

By W. G. KEITH
Manager, Standard Gypsum Co., Seattle, Washington

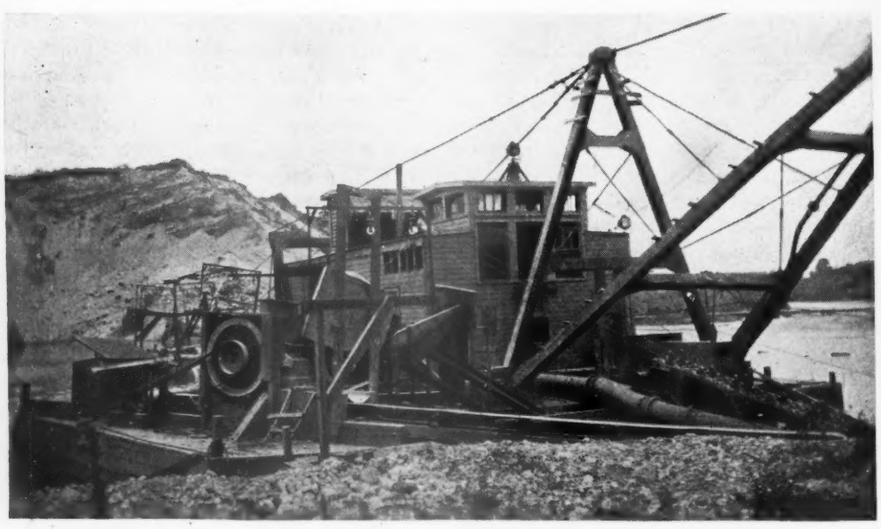
MY "HINT" for superintendents" is a very simple one. Make the company's employes feel that they are working *WITH* the company rather than *FOR* it. That idea is expressed in the following quotation:

"The higher up in life a man goes, the more necessary it becomes that he coöperate with other men. Any man's success depends largely upon the efforts of others, and anyone who is not willing to share his success with these others very sedom has much success to share—Winthrop Mason."

This covers my idea of business life as regards either owner, managing director, or superintendent. The general manager is a hired man working *WITH* the board of directors, the superintendent works *WITH* the manager, the foreman *WITH* the superintendent and the men *WITH* the foreman; otherwise a modern industrial organization is not the success it should be.

Crusher Tender for Suction Dredge

THE gravel ballast plant of the Illinois Central R. R. at Forreston, Ill., has an interesting suction dredge tender. The suction is equipped with a Swintex nozzle to take boulders too big for the pump to handle away from the suction. Instead of dropping these boulders back through a well into the water, as is customary in many similar installations, they drop into the booth of a short bucket elevator which discharges them into a jaw crusher, mounted on a small barge tender alongside the dredge. The crusher output discharges to a short belt conveyor which dumps the stone back at the end of the suction, but crushed to a size that can be pumped to the screening plant on shore—a little kink that we believe has application possibilities at many dredging operations.

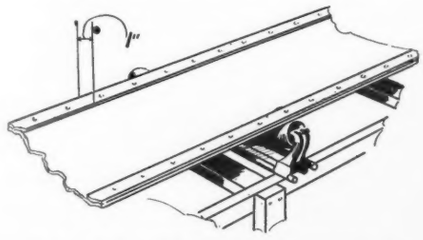


Suction dredge with crusher tender

Increasing the Life of Belt Conveyors

By FRED M. KELLY
With Valley City Stone & Gravel Co., Grand Rapids, Michigan

SUGGEST that all gravel and sand conveying belts be reinforced along each outer margin with an inch strip fastened by rivets on the conveying side of the belt.



Reinforcing the edges of a conveyor belt adds to its efficiency

This is done by using strips of belt cut from old discarded belts.

Advantages: (1) Any size belt will carry increased load. (2) No droppings from belt in motion. (3) Increased life of conveying belt and increased load at any angle used. (4) Saving of belt cast by using smaller width belt—giving larger capacity when edges are so reinforced. (5) Greater economy—greater capacity—greater strength and longer life of belt.

Try it.

Priming a Centrifugal Pump

THERE are several methods of priming a centrifugal pump when it is above the level of the water which is to be pumped. The usual way is to put a valve in the discharge line and to close this valve when the pump is shut down. The line usually holds water enough to prime the pump. A valve to hold back the water in the line is shown in the picture.

Sometimes it happens that the water in the line is lost and it is a great deal of trouble then to prime the pump unless some other method of getting water to the pump has been provided. The picture shows such a method. The vent hole in the top of the pump is connected by a pipe and a piece of hose to a barrel. If the water in the pipe is lost, the barrel may be drawn upon to furnish the water for priming. The barrel may be filled from the pump after the line has been filled. The water passes back through the pump from the head on the line.

Simple and inexpensive method of priming a centrifugal pump

This is an old scheme and used in many places. Still the writer has seen a number of small pumps installed with no method of priming and has found that trouble occasionally resulted from failure to provide such a method. So it seemed worth while to publish this simple and inexpensive arrangement for the purpose.

Self-Cleaning Bar Grizzly

By T. T. LINEAWEAVER
Treasurer, Annville Stone Co., Lebanon, Penn.

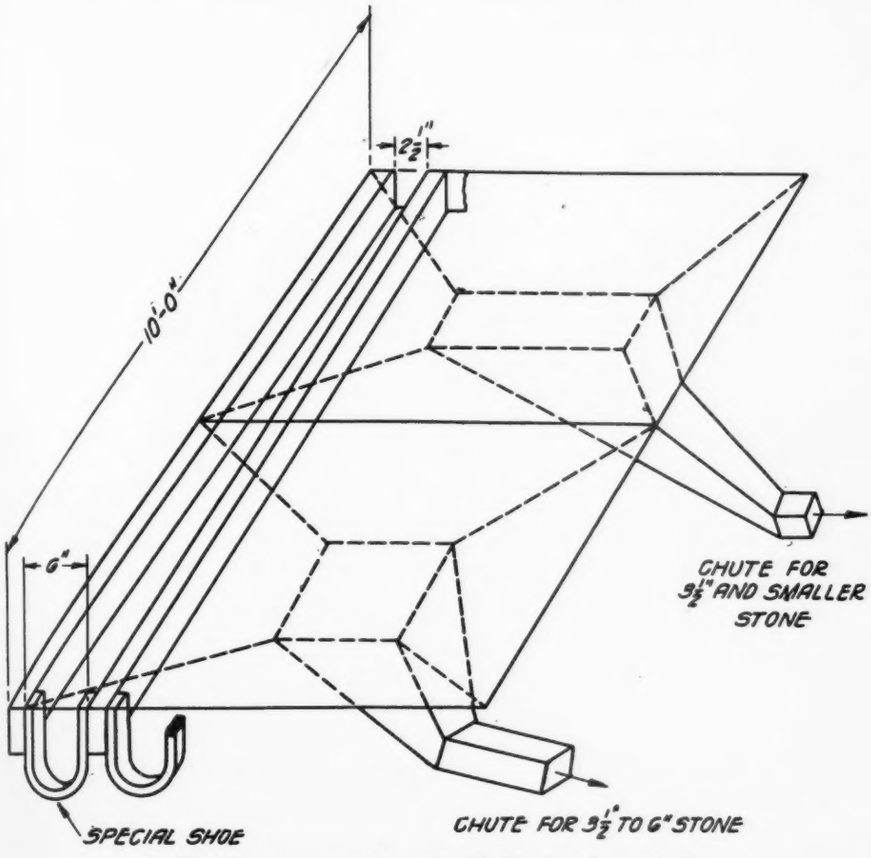
IN THE article on page 57 of the March 20 issue of ROCK PRODUCTS describing our plant reference was made to a self-cleaning bar grizzly. The sketch herewith (drawn by the editors from the original description) is substantially correct. However, the pitch of the chutes should not start so close to the bottom of the bars, as you will understand that the material dropping through the outside bars would not be able to clear underneath.

Regarding the pitch. We experimented with this quite a good deal, as it is a simple matter to raise the support carrying the bottom of the bars so as to get any pitch.

The writer was quite accustomed to hear that 45 deg. was necessary for a stationary grizzly, and one grizzly which we noticed was very steep, and which we were told was 45 deg., when actually measured was only 37 deg. so that we started out with that pitch, and raised the lower end of our bars until we had 34 deg., and we found this more than ample pitch.

The point is, that any stationary grizzly should be set in line with the flow of the material, and in our case the material is delivered to the grizzly from a conveying belt which has a speed of 200 ft. per minute, and when this stone drops on the grizzly bars there is quite a momentum and the stone flows over the top pretty rapidly. I really believe that more effective screening could be obtained by even a little less pitch, but we have not tried it.

The bottom of the shoes which you show must rest on a cross member and that cross member can have extended ends so that the grizzly can be readily raised or lowered to obtain any desired pitch. For the spacing at the top, we use an angle iron with spaces notched out to any desired width. This angle is a little back of the flow of the material from the belt so that there is no wear at that point.



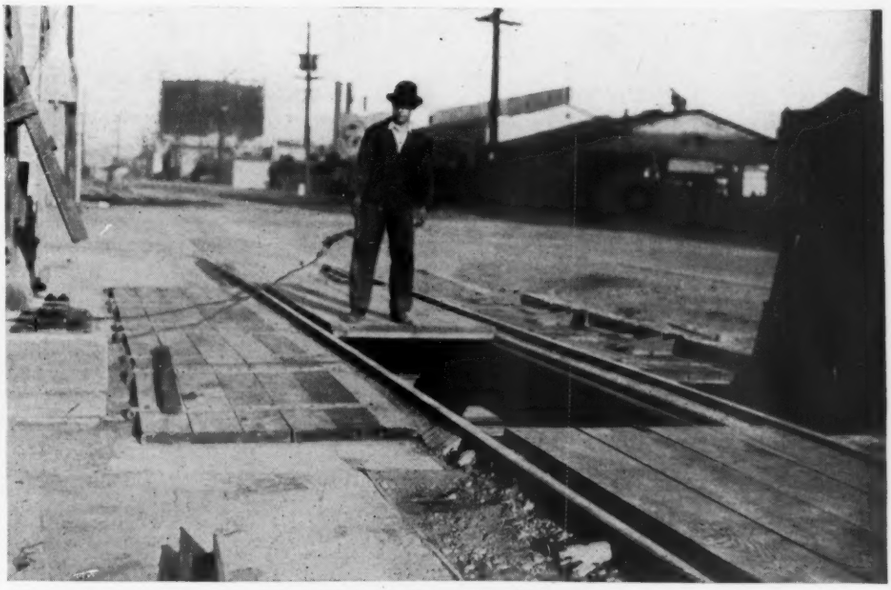
Sketch—not to scale—of self-cleaning bar grizzly

Hopper Pit Covering

TRACK pits, for unloading hopper bottom cars are much in evidence about rock products plants. When it is necessary to place them near sand, gravel and crushed stone service bins, for loading out motor trucks, they are apt to be a nuisance, as well as a hazard. The accompanying view shows how this problem was met at the new plant of the Acme Gravel Co., San Francisco, Calif.

The material is delivered to the plant by dump-bottom, hopper cars, through a concrete pit under the rails, which is of such a length that half a car can be dumped at one time. For closing the top of the pit, there are two heavy wooden coverings. These coverings are carried on casters which are adapted to run on tracks placed between the rails. When material is to be unloaded from a car, these coverings are moved back as shown in the photo. The covering for the pit on the outside of the rails is provided by four large wooden doors which are hinged so that they can be opened up as shown at the extreme right in photo. One man can quickly open these sliding and hinged coverings and just as quickly close them. The pit is of such a capacity that it will hold the contents of an entire carload of material, although only a half a car can be dumped at a time. When half the contents have been dumped, the man in charge attaches a car puller to the half empty car and moves it up into position so that the other half can be dumped.

A bucket conveyor elevates the material from the pit under the tracks to the storage bins, which are divided into 12 compartments of 120 tons capacity each.



Wooden hopper pit coverings carried on casters which run on tracks between the rails

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co. (common)**	Apr. 10	100	128½	128½	1¾% quar. 25% ex. Dec. 1
Alpha Portland Cement Co. (preferred)**	Apr. 13	100	114	.....	1½% quar. Sept. 1
Arundel Corporation (sand and gravel—new stock)	Apr. 13	No par	30	30⅛	30c quar., Apr. 1
Atlas Portland Cement Co. (common)	Apr. 10	No par	48	48½	50c quar.
Atlas Portland Cement Co. (preferred)	.....	100	.....	.....	2% quar. Oct. 1
Atlas Portland Cement Co. (preferred)**	Apr. 13	33⅓	44	47	2% quar. Oct. 1
Bessemer Limestone and Cement Co. (common)‡	Apr. 8	100	142	145	1½% quar. Jan. 1, 4% ex. Jan. 1
Bessemer Limestone and Cement Co. (preferred)‡	Apr. 8	100	106	108	1¾% quar. Jan. 1
Bessemer Limestone and Cement Co. (convertible 8% notes)‡	Apr. 8	.....	120	135	8% annual
Boston Sand and Gravel Co. (common) (r)	Apr. 8	100	60	65	2% quar. July 1
Boston Sand and Gravel Co. (preferred) (d)	Apr. 8	.....	.....	75	1¾% quar. Oct. 1
Boston Sand and Gravel Co. (1st preferred) (d)	Apr. 8	.....	.....	85	2% quar. Oct. 1
Canada Cement Co., Ltd. (common)	Apr. 13	100	102	103	1½% quar. Apr. 16
Canada Cement Co., Ltd. (preferred) (f)	Apr. 8	100	115	116	1¾% quar. Feb. 16
Canada Cement Co., Ltd. (1st 6's, 1929) (f)	Apr. 8	.....	102	103	3% semi-annual A&O
Canada Crushed Stone Corp., Ltd. (6½s, 1944) (f)	Apr. 8	100	92	93	
Charles Warner Co. (lime, crushed stone, sand and gravel)	Apr. 8	No par	21	25	50c quar. Apr. 12
Charles Warner Co. (preferred)	Apr. 8	100	99	102	1¾% quar. Apr. 22
Charles Warner Co. (lime, crushed stone, sand and gravel) 7s, 1929 (r)	Apr. 8	100	103	105	
Cleveland Stone Co.	Apr. 13	.....	169	170	1½% quar., Mar. 1, 1% ex. Mar. 1
Connecticut Quarries Co. (1st Mortgage 7% bonds) (s)	Apr. 8	100	104	.....	
Dolese and Shepard Co. (crushed stone) (a)	Apr. 15	50	78	.....	$1.50 quar. Apr. 1
Giant Portland Cement Co. (common)**	Apr. 13	50	35	40	
Giant Portland Cement Co. (preferred)**	Apr. 13	50	44	48	3½%s.-a. Dec. 15, plus 10% arrears.
Ideal Cement Co. (common)‖	Apr. 13	No par	80	85	$1 quar. Jan. 2. 50c ex. Dec. 27
Ideal Cement Co. (preferred)‖	Apr. 8	100	107	110	1¾% quar. Jan. 2
International Cement Corporation (common)	Apr. 13	No par	60	60⅛	$1 quar. Mar. 31
International Cement Corporation (preferred)**	Apr. 10	100	102½	102½	1¾% quar. Mar. 31
International Portland Cement Co., Ltd. (preferred)	Mar. 1	.....	30	45	
Kelley Island Lime and Transport Co.	Apr. 12	100	120	123	$2 quar. Apr. 1
Lawrence Portland Cement Co.**	Apr. 13	100	110	.....	2% quar.
Lehigh Portland Cement Co.‖	Apr. 13	50	88	92	1½% quar.
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, expire serially up to 1930) (k)	Apr. 8	100	99	100	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, expire serially from 1930 to 1935) (k)	Apr. 8	100	97	99	
Michigan Limestone and Chemical Co. (common)‖	Apr. 8	.....	25	.....	
Michigan Limestone and Chemical Co. (preferred)‖	Apr. 8	.....	25	.....	1¾% quar. Apr. 15
Missouri Portland Cement Co.	Apr. 13	25	53¼	53¼	50c quar. Feb. 1
Monolith Portland Cement Co. (common) (c)	Apr. 9	.....	10¾	10¾	
Monolith Portland Cement Co. (units) (c)	Apr. 9	.....	26¾	28¼	
Monolith Portland Cement Co. (preferred) (c)	Apr. 9	.....	8¼	8¾	
Newaygo Portland Cement Co.*	Apr. 8	.....	120	.....	
New Egyptian Portland Cement Co. (pref.) with common stock purchase warrants (7)	Mar. 27	100	99	102	
New England Lime Co. (Series A, preferred) (i)	Jan. 29	100	96½	99	
New England Lime Co. (Series B, preferred) (s)	Apr. 13	100	92	95	
New England Lime Co. (V.T.C.) (s)	Apr. 13	.....	35	38	
New England Lime Co. (6s, 1935) (m)	Apr. 8	100	99	100	
North American Cement Corp. 6½s 1940 (with warrants)	Apr. 13	.....	98	98	
North American Cement Corp. (units of 1 sh. pfd. plus ½ sh. common) (z)	Apr. 8	.....	94	99	2 mo. period at rate of 7%
North American Cement Corp. (preferred)	Dec. 31	.....	.....	.....	1.75 quar. Feb. 1
Pacific Portland Cement Co., Consolidated ($)	Apr. 9	100	90	92	½% mo.
Pacific Portland Cement Co., Consolidated (secured serial gold notes)§	Apr. 9	.....	100½	101	3% semi-annual Oct. 15
Peerless Portland Cement Co.*	Apr. 8	10	5½	6½	
Petoskey Portland Cement Co.*	Apr. 8	10	9½	10½	1½% quar.
Rockland and Rockport Lime Corp. (1st preferred) (d)	Apr. 8	100	98	98	3½% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (2nd preferred) (d)	Apr. 8	100	.....	70	3% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (common) (d)	Apr. 8	No par	.....	50	1½% quar. Nov. 2
Sandusky Cement Co. (common)*	Apr. 13	100	120	127½	$2 quar. Apr. 1
Santa Cruz Portland Cement Co. (bonds) ($)	Apr. 9	.....	105	106	6% annual
Santa Cruz Portland Cement Co. (common) ($)	Apr. 9	50	87	92	$1 quar. $1 ex. Dec. 24
Superior Portland Cement, Inc. (new stock) (s)	Apr. 9	.....	44	44½	
United States Gypsum Co. (common)	Apr. 13	20	134½	136	2% quar. Mar. 31,
United States Gypsum Co. (preferred)	Apr. 13	100	113	115	1¾% quar. Mar. 31
Universal Gypsum Co. (common)†	Apr. 17	No par	17	17½	
Universal Gypsum V. T. C.†	Apr. 17	No par	16	17	
Universal Gypsum Co. (preferred)†	Aug. 5	.....	76	.....	1¾% quar. Sept. 15
Universal Gypsum Co. (1st mortgage 7% bonds)†	Apr. 17	.....	99	(at 6½%)	
Union Rock Co. (7% serial gold bonds) (y)	Apr. 9	100	100	102	
Wabash Portland Cement Co.*	Aug. 3	50	60	100	
Wisconsin Lime and Cement Co. (1st Mort. 6s, 1940) (o)	Feb. 25	100	98½	100	
Wolverine Portland Cement Co.	Apr. 13	10	6¾	7	2% quar. Aug. 15

*Quotations by Watling, Lerchen & Co., Detroit, Mich. **Quotations by Bristol & Willett, New York. †Quotations by True, Webber & Co., Chicago. ‡Quotations by Butler, Beadling & Co., Youngstown, Ohio. §Quotation by Freeman, Smith & Camp Co., San Francisco, Calif. ‖Quotations by Frederic H. Hatch & Co., New York. (a) Quotations by F. M. Zeiler & Co., Chicago, Ill. (b) Quotations by De Fremery & Co., San Francisco, Calif. (c) Quotations by A. E. White Co., San Francisco, Calif. (d) Quotations by Lee, Higginson & Co., Boston, Mass. (f) Nesbitt, Thomson & Co., Montreal, Canada. (i) E. B. Merritt & Co., Inc., Bridgeport, Conn. (k) Peters Trust Co., Omaha, Neb. (m) Second Ward Securities Co., Milwaukee, Wis. (o) Central Trust Co. of Illinois, Chicago. (r) J. S. Wilson Jr. Co., Baltimore, Md. (s) Chas. W. Scranton & Co., New Haven, Conn. (y) Dean, Witter & Co., Los Angeles, Calif. (z) Hemphill, Noyes & Co., New York. (6) Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. (7) Baker, Simonds & Co., Inc., New York. (8) William C. Simons, Inc., Springfield, Mass.

QUOTATIONS ON INACTIVE ROCK PRODUCTS CORPORATION SECURITIES ON PAGE 92

Editorial Comment

Cheaper or Better Products?

Although there is every prospect that construction work this year will exceed construction work last year—in value anyway—there is much evidence that the producing capacities of several, if not all the rock products industries are increasing in greater ratios. This is certainly so of the portland cement industry in particular localities. What will be the outcome of expanding the industries beyond the limit of their localities to absorb their output? What happens to a barrel when you attempt to force more into it than it can hold? Something has to "bust!" And something is likely to "bust" in the rock products industry if consumption does not take an unheard-of jump, and new enterprises continue to develop at their present rate.

We mistrust that many producers and manufacturers eventually will face the dilemma of much keener competition, either on a basis of lower prices and possible bigger turnovers, or fair and profitable prices with somewhere near present turnovers and quality products. Competition on a quality basis, is, we believe, preferable from all angles to competition on a price-volume basis. The only advantage that can be claimed for a price war is that it weeds out inefficient operations and makes competition easier for the survivors. Competition on a quality basis accomplishes the same end, but in a much fairer, cleaner and more equitable way.

> ***Philip D. Armour once said: "Anybody can cut prices, but it takes brains to make a better article."***

One great advantage of quality competition over cut-price competition at this time is that greater attention to quality in all of the rock products industries will automatically cut down production from 10 to 20%. It will also make is harder for novices to break into the industries; it will compel the owners of the older and more cheaply-built plants to make improvements that will bring their capital investments to somewhere near a par with newer and more expensive plants; it will ingender a friendly, co-operative and helpful spirit of competition rather than a "the devil take the hindmost" attitude.

The chief beneficiary of clean and ethical quality competition is and should be the user of the materials (ultimately the public). While the immediate consumer may think he profits temporarily from a price war, he is bound to be the loser in the long run, for the deficits to be made up, and the liquidation of damages to the whole industry, must eventually come out of his pocket. What he really wants, and what the public always wants, is the best that can be had economically; and never were users of rock products construction materials in a more receptive mood for *better quality products*, than they are right now.

Steel Houses

Several months ago we indulged in some editorial reflections that the rock products industries, like the house in the Biblical proverb, are founded on a rock, figuratively speaking, as well as literally. It is hard to imagine changes in construction materials and methods so radical or revolutionary that the use of rock products will not be increased rather than diminished. Hence, we have followed with much interest a series of articles in *Iron Age* entitled "The Dwellings of Tomorrow." This "dwelling of tomorrow," according to the articles, will furnish a new and great market for structural steel.

Steel houses may cause the lumber man some worry, but not the rock products producer. On the contrary, they will be a boon to the cement, lime, and gypsum producer, because no one contemplates boiler-plate floors, or walls, exterior or interior. The facing and the "filling" in the steel-frame house, must, for the sake of consistency in fireproofness, be made of rock products, and this filling must of necessity be of greater volume than the "skin" coat plaster and stucco work, all too common in "the dwelling of today"—inflammable and flimsy beyond denial.

Consequently, rock products producers and manufacturers can whole-heartedly subscribe to the following premises proposed by the promoters of "the dwelling of tomorrow.":

1. Iron and steel are practical building materials today.
2. Successful use for widely varying purposes has proved their superior utility.
3. Replacement of wood with metal results in safe, strong, and durable homes.
4. Iron and steel frames, lath, joist, tiles, etc., can be produced at a sufficiently low cost to compete with other materials.
5. An eventual large increase in the use of iron and steel for homes is exceedingly probable for these reasons, and
6. Such an increase will increase the market for iron and steel materially and considerably increase the business of many of the metal trades.

The Season's Outlook

Most of the authorities agree that there are no signs of any slackening in the demand for construction, in spite of the recent slump in the value of many industrial securities. The unusual prolongation of winter through all the northern half of the country has caused the beginning of much work to be held up, or delayed, but when the season does begin the demand for rock products promises to break all records. Stocks of portland cement on hand to meet this demand also exceed all records.

QUOTATIONS OF INACTIVE ROCK PRODUCTS SECURITIES

Stock	Date	Par	Price bid	Price asked	Divided rate
Coplay Cement Mfg. Co. (common) (4)	Dec. 16	.....	12½	.....	
Coplay Cement Mfg. Co. (preferred) (1)	Dec. 30	.....	70	.....	
Eastern Brick Corp. 7% cu. pfd.) (1)	Dec. 9	10	40c	.....	
Eastern Brick Corp. (sand lime brick) (common) (1)	Dec. 9	10	40c	.....	
Edison Portland Cement Co. (common)	Nov. 3	50	7½c(x)	.....	
Iroquois Sand & Gravel Co., Ltd. (2 sh. com. and 3 sh. pfd.) (1)	Mar. 17	.....	$12 for the lot	.....	
Edison Portland Cement Co. (preferred)	Nov. 3	50	17½c(x)	.....	
Lime and Stone Products Co. (1100 sh. pfd., $10 par and 700 sh. com., $10 par)	Feb. 10	.....	$66 for the lot	.....	
Missouri Portland Cement Co. (serial bonds)	Dec. 31	.....	104¾	104¾	3¼ % semi-annual
Olympic Portland Cement Co. (g)	Oct. 13	.....	.....	£1⅛	
Phosphate Mining Co. (1)	Nov. 25	.....	1@5	.....	
Pittsfield Lime and Stone Co. (preferred)	.....	100	.....	.....	2% quar. Apr. 1
Rock Plaster Corp. (390 sh. com., no par) (1)	Mar. 17	.....	$12 for the lot	.....	
Simbroco Stone Co. (pfd.)	Dec. 12	.....	.....	.....	$2 Jan. 1
Tidewater Portland Cement Co. (common) (3)	Nov. 25	.....	8½	.....	
Vermont Milling Products Co. (slate granules) 5 sh. pfd. and 1 sh. com. (2)	Dec. 30	.....	$1 for the lot	.....	
Winchester Brick Co. (preferred) (sand lime brick) (5)	Dec. 16	.....	10c	.....	

(g) Neidecker and Co., Ltd., London, England. (1) Price obtained at auction by Adrian H. Muller & Sons, New York. (2) Price obtained at auction by R. L. Day and Co., Boston. (3) Price obtained at auction by Weilepp-Bruton and Co., Baltimore, Md. (4) Price obtained at auction by Barnes and Lofland, Philadelphia, Pa. (5) Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. (x) Price obtained at auction by Barnes and Lofland, Philadelphia, on November 3, 1925.

United Fuel and Supply Bonds and Gold Notes Sold

J. G. WHITE & CO., Inc., New York, and Harris, Small & Co., Detroit, have sold at 100 and interest $2,400,000 first mortgage 6% gold bonds.

Dated April 15, 1926; due April 15, 1941. Principal and interest (A. & O.) payable at Detroit Trust Co., Detroit, trustee, or at New York Trust Co., New York. Denominations $1000 and $500. Redeemable all or part at any time upon 30 days' notice, at 105 and interest up to and including April 15, 1932, and thereafter at one-half of 1% less each year to maturity. Interest payable without deduction for normal Federal income tax not in excess of 2%. Company agrees to reimburse the holder, if requested within 90 days after payment, for the Pennsylvania and Connecticut 4 mill tax, for the Maryland 4½ mill tax, for the Massachusetts income tax not in excess of 6%, and for any future Michigan income tax not in excess of 4%.

Security—A direct first mortgage on all fixed tangible assets, except marine and motor equipment and leasehold interests.

Sinking Fund—Indenture will provide a sinking fund, beginning October 15, 1927, equal to 7½% of the net earnings of the company, after fixed dividend requirements, as defined, which it is expected will retire a substantial amount of this issue before maturity. This sinking fund will be payable semi-annually (A. & O.) and will be applied either to the purchase of bonds in the open market at or below current redemption price, or to the redemption of bonds by lot at such current redemption price. Bonds so acquired are to be cancelled.

Legal Investment—In the opinion of counsel, these bonds are a legal investment for savings banks in Michigan, and are exempt from state, county, and city taxes in Michigan.

The same bankers have sold at 99 and interest, yielding about 6.12% $2,000,000 10-year 6% gold notes.

Dated April 15, 1926; due April 15, 1936. Principal and interest (A. & O.), payable at Union Trust Co., Detroit, trustee, or at United States Mortgage & Trust Co., New York. Denominations $1000 and $500. Redeemable all or part at any time on 30 days' notice at 105 and interest up to and including April 15, 1927, and thereafter at one-half of 1% less for each year or part thereof. Interest payable without deduction for normal Federal income tax not in excess of 2%. Company agrees to reimburse the holder, if requested within 90 days after payment, for the Pennsylvania and Connecticut 4 mill tax, for the Maryland 4½ mill tax, for the Massachusetts income tax not in excess of 6%, and for any future Michigan income tax not in excess of 4%.

Stock Warrants—These notes will carry warrants entitling the holder to purchase shares of the Class B no par value stock at the rate of 10 shares for each $1000 note at $10 per share, at any time after one year and within five years after the date of the notes, and the warrants shall be non-detachable for a period of one year after the date of the notes.

Sinking Fund—Indenture will provide a sinking fund, beginning October 15, 1927, equal to 7½% of the net earnings of the company, after fixed dividend requirements, as defined, which it is expected will retire a substantial amount of this issue before maturity. This sinking fund will be payable semi-annually (A. & O.) and will be applied either to the purchase of notes in the open market at or below current redemption price, or to the redemption of notes by lot at such current redemption price. Notes so acquired are to be cancelled.

Data From Letter of President James D. Kennedy, Detroit, April 6:

Company—A Michigan corporation. Has been organized to acquire, as of January 1, 1926, certain of the assets and going business of the following established companies: Superior Sand and Gravel Co. and United Fuel and Supply Co. (old company). Company has also acquired certain of the assets formerly owned by Delta Brick and Tile Co., Superior Plaster Co., Birmingham Sand and Gravel Co., Detroit Steamship Co., and a 55% stock interest in Huron Sand and Gravel Co.

Company engages in the distribution of building supplies in the city of Detroit and adjacent territory. It also conducts extensive operations in the sale of fuel, and in the manufacture of plaster, and cement products such as sewer pipe, block, brick and tile.

Company operates 18 yards, having a total area of 121 acres. All yards have direct railroad connections, and are equipped with efficient handling and conveying machinery, which is being constantly added to and improved upon. Eight of these yards, aggregating 56 acres, are extremely valuable dock properties, located on the Detroit river. These properties serve not only as docks and receiving yards for the greater part of the company's merchandise, which is delivered by boat, but also as distributing centers to supply the downtown sections of the city. They serve also as important feeders for the inland yards, connected by railroad.

Company owns and operates a fleet of seven steamships, supplemented by tugs and barges, and 148 motor trucks, cars and tractors. Over 1000 people are employed.

CAPITALIZATION

	Authorized	Outstanding
7% cumul. pref. stock (par $100)	$4,000,000	$3,531,700
Class A cumul. $8 stock (no par value)	20,000 shs.	11,729 shs.
Class B stock (no par value)	*105,000 shs.	81,500 shs.
Class C stock (no par value)	12,500 shs.	12,500 shs.

CAPITALIZATION

	Authorized	Outstanding
1st mtge. gold bonds	†$5,000,000	$2,400,000
10-year 6% gold notes	2,000,000	2,000,000

*20,000 shares of class B stock are reserved for issuance to holders of purchase warrants attached to these notes. †Except for $300,000 of bonds issuable at any time for general corporate purposes, issue of additional authorized bonds restricted to an amount not to exceed 50% of the appraised value of real estate hereafter acquired.

Class B and C stocks share alike in any future distribution of dividends or assets, subject to the rights of the preferred and class A stocks. They constitute, in effect, the common stock of the company, but class C stock alone is entitled to vote.

Earnings.—From statements furnished by independent auditors, the earnings of the properties acquired available for bond interest, depreciation and federal income taxes, are shown as follows:

Calendar year 1925	$754,577
Average, three years ending 1925	956,193
Interest on bond issue	144,000
Annual interest charges on bonds and note issue	264,000

Earnings for 1923 and 1924 include earnings of Birmingham Sand and Gravel Co. and Detroit S. S. Co. on the basis of the fiscal years ended March 31, 1924, and March 31, 1925, and for 1925 include such earnings for eight and one-half months ended December 14, 1925.

The J. G. White Engineering Corp. estimates annual depreciation charges of $200,000, based upon values of the properties as appraised, as amply sufficient.

These average net earnings are equivalent to over three and one-half times the combined maximum interest charges on the first mortgage 6% bonds and the issue of notes.

BALANCE SHEET, JANUARY 1, 1926
(AFTER FINANCING)

Assets—	
Total fixed assets	$ 7,763,446
Cash	1,002,275
Merchandise	1,280,908
Invoice in affiliated companies	150,500
Licenses, trade names, etc.	1
Deferred debt items	348,000
Total	$10,545,130
Liabilities—	
First mortgage 6% bonds	$ 2,400,000
10-year 6% notes	2,000,000
7% preferred stock	3,531,700
Balance, applicable to 11,729 shares class A stock, and 94,000 shares class B and C stock	2,613,430
Total	$10,545,130

Southern Phosphate Shows Deficit

A DEFICIT of $256,548 after taxes, interest and reserve for depreciation and depletion was reported by the Southern Phosphate Co. for 1925. This compares with a deficit of $82,202 in the previous year.—*Chicago Journal of Commerce.*

Consolidated Cement Corporation Bonds Offered

E. H. ROLLINS AND SONS, A. B. Leach and Co., Inc., Illinois Merchants Trust Co., Hornblower and Weeks, Brokaw and Co., Mitchell, Hutchins and Co. are offering $4,000,000 of the Consolidated Cement Corp. first mortgage 6½% sinking fund gold bonds, Series A, dated March 1, 1926, due March 1, 1941, at 98.50 and interest, yielding over 6.65%.

The corporation agrees to pay interest without deduction for any normal federal income tax, not exceeding 2%, which the corporation or the trustee may be required or permitted to pay at the source.

The following information is taken from the brokers' prospectus:

Business and Properties: The Consolidated Cement Corp. was recently formed under the laws of Delaware for the purpose of owning and operating plants engaged in the manufacture of portland cement. The corporation is about to acquire the business and assets of the Peninsular Portland Cement Co., the Fredonia Portland Cement Co. and the Great Western Portland Cement Co. These companies own and operate plans of modern design located at Cement City, Mich., and Fredonia and Mildred, Kan., and constitute well established and successful operating units.

These plants are exceptionally well located with respect to the markets for the sale of their products and are close to abundant supplies of raw material of high quality. The combined output for the plants in 1925 was over 2,566,000 bbl. With the addition of new kilns and other equipment now installed the combined capacity of the three plants will be in excess of 3,000,000 bbl. The raw material deposits of the above described properties are more than sufficient to meet the requirements of these plants for the next 50 years.

Security: These bonds, in the opinion of counsel, will be secured by direct first mortgage on the entire fixed property of the corporation now owned or hereafter acquired subject to purchase money liens or underlying liens, if any, on hereafter acquired property. Additional bonds may only be issued under conservative restrictions, as provided in the trust indenture.

Earnings: The combined net income of the properties to be owned by the Consolidated Cement Corp. as determined by Messrs. Arthur Andersen and Co. from their audits of the Fredonia Portland Cement Co. and the Peninsular Portland Cement Co., and the audits of the Great Western Portland Cement Co. by Messrs. Smith, Lunsford and Wright, for the years prior to 1925, and by Messrs. Price, Waterhouse and Co. for the year 1925, and for the 12 months ended December 31, 1925, before depletion, depreciation and taxes is given below.

COMBINED PRODUCTION, SALES AND EARNINGS

Year—	Production in Bbls.	Net Sales	Net Avail. for Int., Deplet., Deprec., etc.
1923	1,707,393	$2,997,538	$ 837,282
1924	2,157,696	3,441,052	1,039,708
1925	2,566,000	3,779,734	1,192,687

Assets: Consolidated balance sheet as of December 31, 1925, prepared by Messrs. Arthur Andersen and Co., on the basis of the audits referred to above and adjusted to give effect to the present financing and appraisal of plant assets by the American Appraisal Co., shows net tangible assets having a value of $7,305,680. Consolidated net current assets as shown in said balance sheet, amount to $1,301,798. Current assets are about five and one-quarter times current liabilities.

BALANCE SHEET AS OF DECEMBER 31, 1925 (AFTER FINANCING)

Assets—	
Cash	$ 621,319
Receivables	141,640
Inventories	808,292
Investment securities	25,855
Life insurance	11,500
Deferred charges	422,400
Plant assets	6,003,882
Good-will, patents, trade marks	1
Total	$8,034,949
Liabilities and net worth—	
7% cumulative preferred stock	$1,465,400
Common stock	*1,162,741
6½% 1st. mortgage bonds	4,000,000
6½% 5-year notes	1,100,000
Trade creditors	212,042
Payroll and sundry	17,402
Liability insur. and gen. taxes	17,452
State and federal taxes	59,911
Total	$8,034,949

*Authorized and issued 100,000 shares of no par value, including capital surplus at date of organization.

Sinking Fund: The indenture will provide for a minimum sinking fund for the retirement of Series A bonds of $75,000 per annum, payable semi-annually commencing January 1, 1927. In addition the corporation will covenant to set aside annually, as an additional sinking fund to purchase and retire Series A bonds, a sum equivalent to the amount by which 20% of the net income of the corporation, after depreciation, depletion, taxes, interest and preferred dividends, as provided in the indenture, for the preceding fiscal year, shall exceed the sum of $75,000, subject, however, to allocations of portions of such additional sinking fund to bonds of other series, as provided in the indenture. It is estimated that the operation of this fund will retire approximately 75% of this issue of Series A bonds by maturity.

Management: While each plant retains all of the advantages of local operation and of a complete local organization, the corporation will be under the direct supervision of the Cowham Engineering Co. John L. Senior, president of this organization, will also be president of the Consolidated Cement Corp.

Consumers Rock and Gravel Company Bonds Offered

DEAN, WITTER AND CO., Los Angeles, Calif., are offering at prices to yield from 6% to 7%, according to maturity, $500,000 first (closed) mortgage 7% serial gold bonds of the Consumers Rock and Gravel Co., Los Angeles, Calif., dated March 1, 1926, and due serially September 1, 1927-1938, inclusive.

Callable as a whole or in part on any interest date on 30 days' published notice at par and accrued interest, plus a premium of ½ of 1% for each year, or fraction thereof, of unexpired life, said redemption price not to exceed 103% of the par value plus interest. Coupon bonds in denominations of $1000 and $500 registerable as to principal. Interest payable on March 1 and September 1. Exempt from personal property taxes in California. Normal federal income tax up to 2% paid at the source. Bank of Italy, trustee.

Frank Gautier, president and general manager of the Consumers Rock and Gravel Co., has summarized his attached letter as follows:

History and Business — The Consumers Rock and Gravel Co. was incorporated in 1912 and came under the control of the present stockholders and management in the latter part of 1913. Since that time the company has shown large earning power on its invested capital and through a conservative dividend policy and reinvestment of earnings, its properties have been developed to their present daily capacity of over 8000 tons of crushed rock and gravel and screened gravel and sand.

Properties—The company owns in fee 14.14 acres of land situated at the corner of Twenty-sixth and South Alameda streets, Los Angeles, which is splendidly adapted to its needs and which is also exceedingly valuable for industrial purposes. John P. Kennedy has conservatively valued the land alone in this tract at $347,347.44, and the plant and equipment with a valuable lease on six acres of ground for excavating purposes is valued at $378,500.

Four plants in the San Fernando valley, together with 120 acres of land owned in fee and a lease on 838 acres of ground are independently appraised by S. K. Dahl, mining engineer, at $1,034,780.

The company intends to use approximately $350,000 of the proceeds of this bond issue for the construction of a new plant with a yearly capacity of one million tons of material and for improvements and betterments to existing plants so that the above values amounting to $1,760,627 will shortly be increased to approximately $2,110,627, or more than four times the amount of this first closed mortgage bond issue.

Earnings: The following statement for the past four years has been prepared and certified by Messrs. Haskins and Sells:

Fiscal year ended	Net before depreciation depletion, etc.	Depreciation and depletion	Net earnings available for federal taxes and int. on these bonds
Dec. 31, 1922	$129,904.76	$41,487.25	$ 88,417.51
Dec. 31, 1923	282,081.84	66,017.81	216,064.03
Dec. 31, 1924	148,194.44	63,813.15	84,381.29
Dec. 31, 1925	199,075.94	72,257.40	126,818.54

CONSUMERS ROCK AND GRAVEL CO.
BALANCE SHEET
As of December 31, 1925
(Before giving effect to the present financing)

ASSETS

Property—		
Land, owned in fee (appraised value)		$ 447,107.44
Land, held under lease (appraised value)		337,400.00
Buildings, machinery, and equipment	$568,241.17	
Less—Reserve for depreciation	186,597.59	
Remainder		381,643.58
Total property		$1,166,151.02
Inv. in subsidiary companies—		
Bernal Marl Fertilizer Co.		$ 51,025.49
Western Rock and Gravel Co.		2,878.20
Total inv. in sub. companies		$ 53,903.69
Securities owned		2,000.00
Current Assets—		
Cash		$ 33,836.26
Notes receivable		2,042.08
Accounts receivable—Customers (less reserve for losses, $7,500.00)		164,269.96
Miscellaneous		11,704.91
Total current assets		$ 211,853.21
Deferred Charges—		
Insurance premiums, unexp. portion		1,580.80
Prepaid taxes		1,918.99
Total deferred charges		$ 3,499.79
Total		$1,437,407.71

LIABILITIES

Capital Stock, Authorized and Outstanding—	
300,000 shares at $1.00 each	$ 300,000.00
Current Liabilities—	
Notes payable	$ 18,541.60
Accounts payable	68,343.59
Accrued salaries and wages	8,259.57
Federal income taxes, 1925 (estimated)	16,460.70
Total current liabilities	$ 111,605.46
Due to stockholders	66,076.20
Reserve for refilling excavated props.	78,571.36
Capital surplus	587,640.86
Profit and loss surplus	293,513.83
Total	$1,437,407.71

Portland Cement Output in March

Stocks of Portland Cement at 23,212,000 Barrels—Greatest of All Times

MARCH shipments of portland cement showed a decrease of almost 7% as compared with March, 1925, according to Bureau Mines, Department of Commerce. Production shows a decrease of 711,000 bbl. compared with March, 1925, while stocks of portland cement are the greatest in the history of the industry and are almost 12% greater than in March, 1925, and about 4% more than at the end of February, 1926. The following tables, prepared by the Division of Mineral Resources and Statistics of the Bureau of Mines, are compiled from reports for March, 1926, received direct from all manufacturing plants except three, for which estimates were necessary on account of lack of returns.

Clinker Stocks

Stocks of clinker, or unground cement, at the mills at the end of March, 1926, amounted to about 12,277,000 bbl., compared with 10,931,000 bbl. (revised) at the beginning of the month.

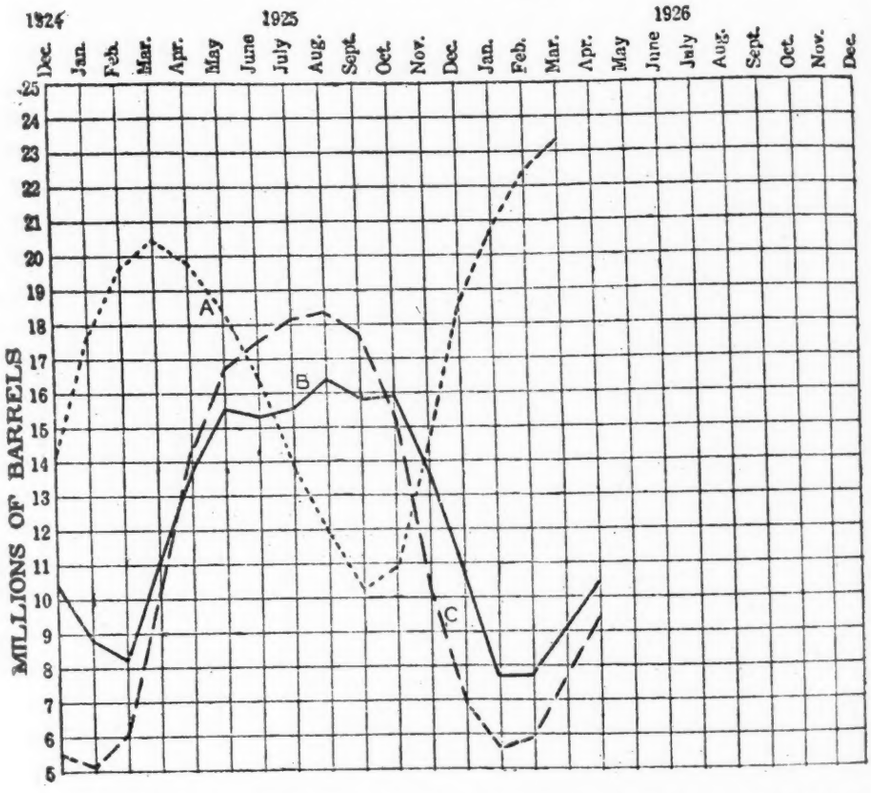
An estimate of the unground clinker by months is given below.

ESTIMATED CLINKER (UNGROUND CEMENT) AT THE MILLS AT END OF EACH MONTH, 1925 AND 1926, IN BARRELS

Month	1925	1926
January	7,017,000	9,074,000
February	8,497,000	*10,931,000
March	9,962,000	12,277,000
April	9,731,000	
May	9,053,000	
June	7,937,000	
July	6,961,000	
August	5,640,000	
September	4,561,000	
October	4,086,000	
November	5,013,000	
December	*6,649,000	

*Revised.

MONTHLY FLUCTUATIONS IN PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT


1924
1925
1926
Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
MILLIONS OF BARRELS
25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5
A
B
C

(A) Stocks of finished portland cement at factories; (B) production of finished portland cement; (C) shipments of finished portland cement from factories

Distribution of Cement

The following figures show shipments from portland cement mills distributed among the states to which cement was shipped during the months of January and February in 1925 and 1926:

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES, IN JANUARY AND FEBRUARY, 1925 AND 1926, IN BARRELS*

Shipped—	January, 1925	January, 1926	February, 1925	February, 1926
Alabama	85,410	129,291	103,513	145,636
Alaska	132	165	.....	264
Arizona	34,370	38,869	25,945	28,956
Arkansas	41,376	46,708	44,352	55,984
California	988,883	931,238	753,123	714,783
Colorado	42,425	29,203	69,871	51,068
Connecticut	34,810	40,420	50,026	29,323
Delaware	5,786	8,815	9,444	6,437
District of Columbia	37,285	38,410	65,176	47,086
Florida	265,463	483,824	227,811	445,674
Georgia	93,062	80,129	98,569	86,417
Hawaii	417	10,757	.....	15,830
Idaho	2,598	19,198	11,029	19,524
Illinois	463,388	323,947	378,947	429,654
Indiana	139,782	85,724	143,464	121,253
Iowa	53,044	28,439	52,039	50,077
Kansas	33,588	56,598	120,405	114,296
Kentucky	52,013	35,560	68,970	56,249
Louisiana	75,992	65,695	97,638	84,706
Maine	4,837	20,310	5,238	19,084
Maryland	47,635	79,497	98,231	77,537
Massachusetts	113,101	101,327	134,591	57,390
Michigan	190,905	222,061	248,240	253,661
Minnesota	59,395	66,063	97,034	72,714
Mississippi	29,867	44,140	28,564	47,179
Missouri	115,141	137,343	162,992	202,914
Montana	5,334	9,716	6,093	9,867
Nebraska	31,832	23,788	46,281	49,054
Nevada	2,492	2,508	5,177	5,754
New Hampshire	9,419	17,081	15,911	12,750
New Jersey	157,612	254,912	243,534	163,588
New Mexico	7,911	33,613	10,320	14,308
New York	400,896	571,447	587,674	434,332
North Carolina	79,817	81,764	128,770	139,656
North Dakota	1,380	3,338	3,742	4,903
Ohio	259,628	220,728	271,075	250,265
Oklahoma	58,872	101,087	155,083	167,043
Oregon	54,117	53,995	60,816	58,991
Pennsylvana	288,916	426,140	421,519	351,940
Porto Rico	.....	.....	.....	.....
Rhode Island	15,668	18,694	17,908	10,166
South Carolina	46,840	44,723	73,312	56,022
South Dakota	4,331	6,413	14,528	18,848
Tennessee	69,669	66,379	87,499	86,871
Texas	260,540	270,231	345,057	364,107
Utah	3,794	10,655	16,821	15,613
Vermont	3,129	2,219	3,060	1,640
Virginia	54,455	61,645	95,942	77,572
Washington	85,969	72,393	90,669	77,936
West Virginia	45,912	39,983	56,629	45,121
Wisconsin	113,396	60,400	73,320	80,066
Wyoming	3,492	5,797	9,181	11,710
Unspecified	15,964	17,162	26,430	52,720
	5,092,090	5,600,541	5,961,563	5,794,530
Foreign countries	69,910	71,459	53,437	25,470
Total shipped from cement plants	5,162,000	5,672,000	6,015,000	5,820,000

*Includes estimated distribution of shipments from three plants each month.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1925 AND 1926, IN BARRELS

Month	Production 1925	Production 1926	Shipments 1925	Shipments 1926	Stocks at end of month 1925	Stocks at end of month 1926
January	8,856,000	*7,887,000	5,162,000	*5,672,000	17,656,000	*20,582,000
February	8,255,000	7,731,000	6,015,000	5,820,000	19,897,000	*22,388,000
March	11,034,000	†10,323,000	10,279,000	†9,499,000	20,469,000	†23,212,000
First quarter	28,145,000	25,941,000	21,456,000	20,991,000	.....	.....
April	13,807,000	.....	14,394,000	.....	19,877,000	.....
May	15,503,000	.....	16,735,000	.....	18,440,000	.....
June	15,387,000	.....	17,501,000	.....	16,409,000	.....
Second quarter	44,697,000	.....	48,630,000	.....	.....	.....
July	15,641,000	.....	18,131,000	.....	13,896,000	.....
August	16,419,000	.....	18,383,000	.....	11,952,000	.....
September	15,939,000	.....	17,711,000	.....	10,247,000	.....
Third quarter	47,999,000	.....	54,225,000	.....	.....	.....
October	15,992,000	.....	15,309,000	.....	10,979,000	.....
November	13,656,000	.....	10,187,000	.....	14,534,000	.....
December	*10,713,000	.....	*6,917,000	.....	*18,365,000	.....
Fourth quarter	40,361,000	.....	32,413,000	.....	.....	.....
	161,202,000	.....	156,724,000	.....	.....	.....

*Revised. †Includes estimate for three plants and subject to revision.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN MARCH, 1925 AND 1926, AND STOCKS IN FEBRUARY, 1926, IN BARRELS

Commercial district	Production—March 1925	Production—March 1926	Shipments—March 1925	Shipments—March 1926	Stocks at end of March 1925	Stocks at end of March 1926	Stocks at end of February, 1926
E.n Penn., N. J. & Md.	3,054,000	3,033,000	2,758,000	2,416,000	5,042,000	5,732,000	5,115,000
New York	484,000	374,000	445,000	335,000	1,272,000	1,629,000	1,590,000
Ohio, W'n Penn. & W. Va.	816,000	586,000	776,000	675,000	2,017,000	2,703,000	2,792,000
Michigan	566,000	223,000	428,000	390,000	1,323,000	1,780,000	*1,947,000
Wis., Ill., Ind. & Ky.	1,406,000	†1,213,000	1,214,000	†947,000	3,739,000	†3,966,000	3,700,000
Va., Tenn., Ala. & Ga.	1,064,000	1,241,000	1,048,000	1,188,000	706,000	1,111,000	1,058,000
E'n Mo., Iowa, Minn. & S. Dak.	887,000	745,000	864,000	724,000	3,271,000	3,087,000	3,066,000
W'n Mo., Neb., Kans. & Okla.	867,000	848,000	803,000	760,000	1,562,000	1,487,000	1,399,000
Texas	422,000	451,000	422,000	403,000	342,000	536,000	*488,000
Colo. & Utah	101,000	†134,000	168,000	†172,000	306,000	†206,000	244,000
California	1,128,000	†1,226,000	1,082,000	†1,224,000	514,000	†513,000	511,000
Ore., Wash. & Mont.	239,000	249,000	271,000	265,000	375,000	462,000	478,000
	11,034,000	†10,323,000	10,279,000	†9,499,000	20,469,000	†23,212,000	*22,388,000

*Revised. †Figures include estimate for one plant each in Indiana, Utah, and California and are subject to revision.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1925 AND 1926

Month	Imports 1925 Barrels	Imports 1925 Value	Imports 1926 Barrels	Imports 1926 Value	Exports 1925 Barrels	Exports 1925 Value	Exports 1926 Barrels	Exports 1926 Value
January	231,258	$364,196	360,580	$576,717	71,596	$207,547	72,939	$216,431
February	119,077	206,308	314,118	527,948	56,249	181,356	73,975	220,706
March	218,048	337,039	(†)	(†)	65,248	200,410	(†)	(†)
April	197,686	280,826	.....	.....	89,508	263,831	.....	.....
May	186,897	286,959	.....	.....	85,385	250,845	.....	.....
June	254,937	409,539	.....	.....	71,343	217,899	.....	.....
July	335,118	499,602	.....	.....	98,141	286,543	.....	.....
August	379,847	611,551	.....	.....	103,961	289,904	.....	.....
September	513,252	789,121	.....	.....	102,649	285,225	.....	.....
October	535,050	824,268	.....	.....	73,369	228,467	.....	.....
November	388,604	678,518	.....	.....	101,825	294,201	.....	.....
December	295,543	526,001	.....	.....	100,323	296,900	.....	.....
	3,655,317	$5,813,928	.....	.....	1,019,597	$3,003,128	.....	.....

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO IN FEBRUARY, 1926*

	Barrels	Value
Alaska	386	$1,214
Hawaii	12,452	27,228
Porto Rico	3,116	7,247
	15,954	$35,689

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN FEBRUARY, 1926

Exported to	Barrels	Value
Canada	346	$2,296
Central America	2,360	7,578
Cuba	13,072	31,105
Other West Indies	4,932	11,982
Mexico	8,401	25,570
South America	37,391	114,391
Other countries	7,473	27,784
	73,975	$220,706

*Compiled from records of the Bureau of Foreign and Domestic Commerce and subject to revision.

†Imports and exports in March, 1926, not available.

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES, AND BY DISTRICTS, IN FEBRUARY, 1926

Imported from	District into which imported	Barrels	Value
Belgium	Florida	176,865	$299,331
	Massachusetts	15,781	22,172
	New Orleans	6,166	8,651
	New York	560	810
	Oregon	3,604	4,721
	San Francisco	11,957	8,520
	Total	214,933	$344,205
Canada	Maine & N. H.	12	$43
Denmark and Faroe Islands	Florida	10,723	$25,346
	Porto Rico	62,154	99,355
	Total	72,877	$124,701
Esthonia	Florida	23,978	$53,989
France	Massachusetts	584	$619
Japan including Chosen	Hawaii	494	$723
Soviet Russia in Europe	New York	90	$196
United Kingdom	Los Angeles	1,150	$3,472
	Grand total	314,118	$527,948

Predict No Break in Portland Cement Prices

ANY lower prices on portland cement to the consumer must come about through a readjustment of freight rates or a reduction in general overhead costs at plants, according to a digest of conditions in the cement industry, issued by the Central Trust Co. of Illinois. The report says that wages of workers and the cost of raw materials combined will continue to bear about their present relation to total manufacturing costs.

It continues:

"From 1914 to 1923, the average wage of workers in portland cement plants increased 118%; while, during the same period, the wholesale price of cement at the plant increased 104%. Fortunately, during the same period, the cost of raw materials to make a barrel of cement decreased from 51% of the factory selling price to 42.5%, this decline in the cost of raw materials helping to offset the increase in average wages.

"Largely because the portland cement needs of the country have been anticipated in present plant capacity, it is expected that portland cement prices will remain at present levels, or possibly decline somewhat, if plant capacity can be more fully employed and the overhead on a barrel of product thereby reduced."—*Chicago Journal of Commerce.*

South Dakota State Cement Plant Opens Season with Orders for 300,000 Barrels

THE state-owned cement plant at Rapid City, S. D., recently resumed operation after its winter shutdown, with orders in excess of 300,000 bbl. already in sight. This represents about 80% of its entire 1925 output. Only about 25,000 bbl. of finished cement are now on hand in the storage silos which have a capacity of 100,000 bbl.

The plant, although in operation a short time, is running smoothly and up to capacity. According to E. E. Hartley, sales manager, the shipments are already double those of the plant at the same time last year and almost up to the capacity of the plant which is about 2000 bbl. per day.

"Everything is in first-class shape, and we are ready for the big season which we expect," Superintendent William Fowden said. "We are now employing about 70 men and this will probably be increased to 100 soon."—*Rapid City (S. D.) Journal.*

Union Rock Company Adds to Holdings

THE Fewell and Webb Rock and Gravel Co. has been acquired by the Union Rock Co., Los Angeles, Calif., according to E. S. Oliver, manager. The plant is located at 415 Second street, Hermosa Beach, and will be developed to take care of the growing needs of the district.

Spring Meeting of the Empire State Sand and Gravel Producers' Association

Albany Meeting, April 6, Discusses Proposed Changes in Freight Rates—Visit to the Albany Gravel Company Plant

THE EMPIRE STATE SAND AND GRAVEL PRODUCERS' ASSOCIATION held its regular meeting at the Albany Club, Albany, N. Y., Tuesday, April 6. The only business of importance that came before the meeting was in regard to a proposal that freight rates be figured on a mileage basis. The proposed rates were discussed, but no definite action was taken, as it was thought the effects of any change in rates needed more consideration than could be given at the meeting. The matter was left in the hands of the officers of the association, who were asked to study the rate situation and report at the next meeting.

Some of the members who came to Albany from other towns arrived early enough in the morning to make up a party to visit the plant of the Albany Gravel Co. This plant is being entirely rebuilt so that it will be in effect a new plant. The central portion of the bins of the old plant is all that has been retained. G. K. Smith, head of the Albany Gravel Co., and vice-president of the association, and Superintendent Crowley showed the visitors through the plant.

Sand and gravel producers of New York state at the Albany Gravel Co.'s plant. Left to right—G. K. Smith, Carleton Oaks, J. E. Carroll, Nathan Oaks, J. G. Carpenter and H. L. Marsh

At noon the members assembled at the Albany Club, where luncheon was served. Paul Schultz, who is the head of the bureau for testing state highway materials, was a guest at the luncheon. Later, at Mr. Schultz's invitation, the members visited the testing department laboratory and were shown how tests were made. Concrete cylinders and briquettes were broken, and the tests for abrasion of gravel and the like were thoroughly explained. To show the capabilities of the machine tests were also made on steel reinforcing bars, for tension and bending.

An interesting series of tests shown was part of the new method of testing cement which many laboratories all over the United States are trying out on similar samples at this time. The new method is designed to eliminate the personal equation so far as is possible from the testing of cement.

Those who were present were: J. E. Carroll, J. E. Carroll Sand Co., Buffalo, president of the association; G. K. Smith, Albany Gravel Co., Albany, vice-president of the association; John G. Carpenter, Madison Sand and Gravel Corporation, Rochester, secretary of the association; Nathan Oaks and Carleton Oaks, of Nathan Oaks and Sons, Oaks Corners; P. M. Dwyer, Croton Sand and Gravel Co., Croton-on-Hudson; C. W. Maxwell, Albany Gravel Co.; H. L. Marsh, Consolidated Materials Corp., Rochester; George N. Dulin, Neal F. Ryan Co., Schenectady; Paul Schultz, New York State Highway Department, and Edmund Shaw, Rock Products, Chicago.

The next meeting will be in September.

Although the attendance at this meeting was small, the membership list has increased considerably since the last meeting, and it now includes almost all the producers in the state outside of those in and around New York City. The reason for the small attendance at this meeting is that many producers are very busy getting the plants in shape for the beginning of the season's production.

Albany Gravel Co.'s Improvements

The new plant of the Albany Gravel Co., as already noted, has a number of interesting features. One of these is a circular hopper which is to receive the bank material. The hopper is of circular shape so that it can receive material brought in from any direction by the scraper bucket. There will be one central mast and several other masts placed around the hopper so that the rope can be brought in to the hoist at any angle.

The hoist is a geared hoist built by the Clyde Iron Works. It is placed on a concrete foundation and a house of concrete blocks is being built around it.

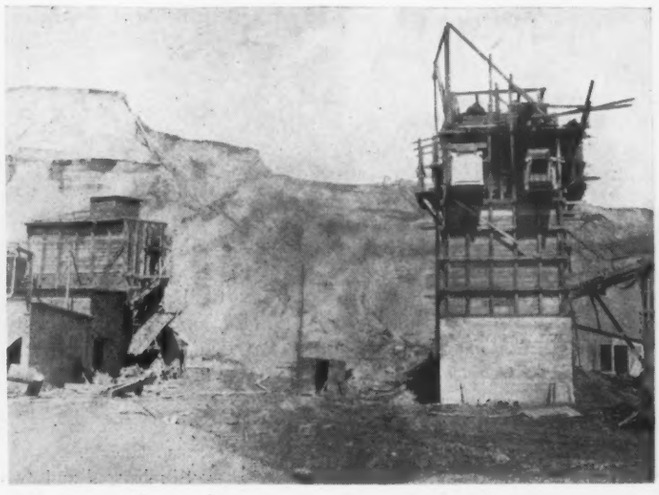
The hopper is provided with a feeder to a conveyor belt, that takes the bank material to a scalping screen 15 ft. long and 48 in. in diameter with 2¾ in. perforations. The oversize goes to a 12x24 in. Acme jaw crusher and the crushed material and the undersize of the scalping screen goes by a belt conveyor to two sizing screens above the plant bins. These are among the longest screens ever installed in a gravel plant. They are 30 ft. long, including a short scrubbing section. The first section of the screen has 9/16 in. perforations, with a ¼ in. jacket outside. Beyond this is a rinsing section with ¼ in. holes. This is to rinse the gravel clean by sprays before it is sized. The sections which follow have 1¾ in. and 2 in. perforations. The screens are driven by a large miter gear and pinion at the end, as stone screens are most often driven.

The sand recovery portion of the plant is unusually large, as it contains six Good Roads Machinery Co. sand boxes. Two of these are 20x4 ft., two are 18x4 ft. and two are 12x4 ft. All have 8-ft. throats. These boxes are arranged in series, in two lines. The first boxes will settle out concrete sand, the remaining boxes plaster sand. The drive of these boxes is unusual, as each box has its own motor and Foote Bros. speed reducer. A further reduction is obtained through a large gear.

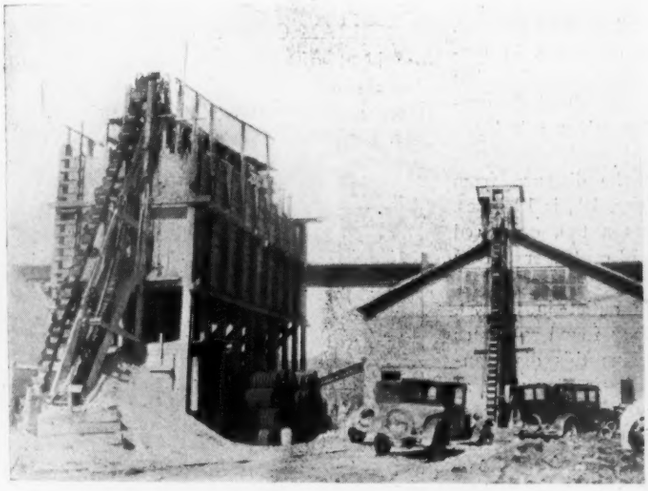
Water is supplied from a pumping station some distance from the plant. A 6-in. Gould pump with direct-connected motor is already in place and an 8-in. pump of the same type is being installed. These pumps are connected by a Y to a 10-in. line which

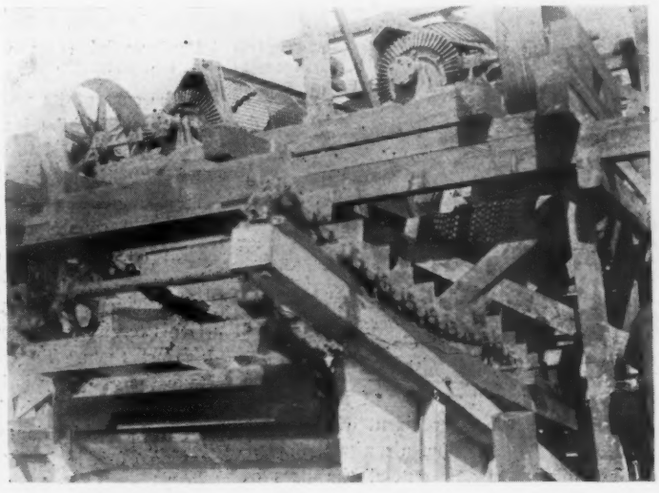
goes over the hill to the plant.

The Albany Gravel Co. has a fine concrete pipe plant, where culvert pipe especially for highway work is made. The wet process is used. The concrete is mixed in a 13 cu. ft. mixer and "spaded" into the molds by hand. It is mixed to about a 1 in. slump, so a very strong concrete is the result. Everything is cured for a day in a steam room and the pipe and molds are handled on cars by the usual system of parallel tracks and a transfer truck.

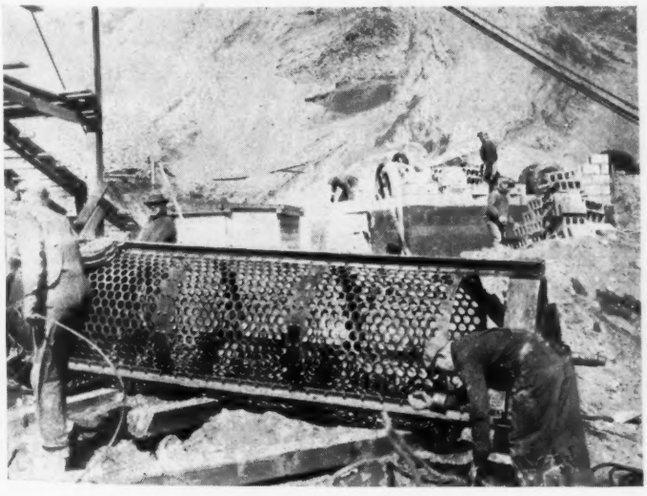


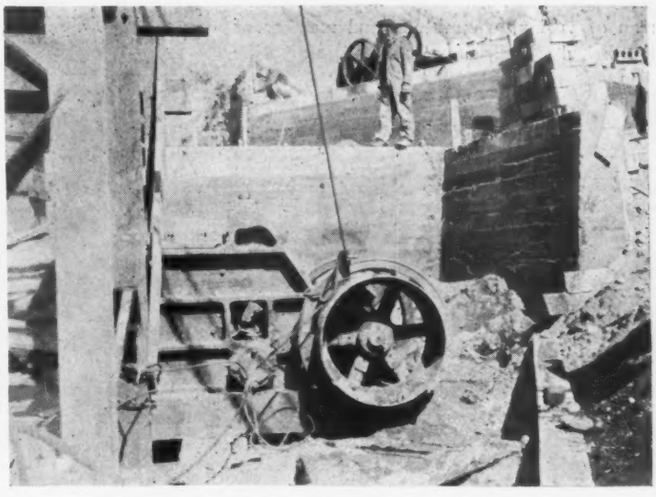
Left—Octagonal feed hopper which is to be arranged so that the drag scraper bucket can be drawn from any angle. Right—End view of the new and old plants





Left—Aggregate bins and the concrete pipe plant. Right—Drive ends of the 30 ft. screens and the concrete sand recovery boxes





Left—Preparing to lift the 16 ft. by 40 in. scalping screen to its place. Right—Installing the new jaw crusher

Blaine S. Smith Elected Vice President of Universal Portland Cement Company

BLAINE S. SMITH, who started as a salesman with the Universal Portland Cement Co. in 1908, from which he advanced through various positions to that of general sales manager in 1915, and in which position he is credited with developing one of the most successful selling organizations in the country, was elected vice-president of the

Blaine S. Smith, recently elected vice-president of the Universal Portland Cement Co.

company at a recent meeting of its board of directors. He also is president of the Portland Cement Association, a national organization to improve and extend the uses of concrete.

For many years Mr. Smith has been identified with the Chicago Association of Commerce as vice-president, member and chairman of various committees, and member of the board of directors, which position he also fills on the Illinois Chamber of Commerce. He is a member of the American Society for Testing Materials, American Concrete Institute, Western Society of Engineers, U. S. Chamber of Commerce, Chicago Athletic Association, Union League Club and Exmoor Country Club.

The Universal Portland Cement Co. has plants at Chicago, Pittsburgh and Duluth, and recently purchased land at Cleveland, where a new plant of 1,500,000 bbl. annual capacity will be built. A description and layout of the proposed plant was published in ROCK PRODUCTS, February 6 issue. General offices of the company are in Chicago, with district offices in Pittsburgh, Minneapolis, Duluth, Cleveland, Columbus and New York.

Missouri Gravel Producer Testifies on Advantages of Water Haul

"THERE is a tremendous development of waterway transportation at the present time and hauling by barges will be the all-important factor eventually."

So declared O. W. Ellis, secretary of the Missouri Gravel Co., La Grange, Mo., who represented his company at the recent hearing at Kansas City, Mo., before Examiner F. E. Mullen of the Interstate Commerce Commission, in its application for reduced rates to consuming sections of Iowa and Illinois.

Development of a barge system for hauling sand, gravel and crushed stone products of the company was brought out in the testimony of Mr. Ellis before the commission. Later Mr. Ellis pointed out extensive plans and possible rate savings in adopting water transportation.

Six barges and two steamboats were put in service on the Missouri river as soon as the company was organized about a year ago. Rail rate prohibited competition with other producers of sand, gravel and crushed stone in Iowa, Illinois and even in Indiana. Preferential rates were overcome in several instances by water transportation, but in the case of its products much of the consumption is inland and requires rail hauls to destination.

Mr. Ellis stated that the distance from La Grange, Mo., to Quincy, Ill., is 10 miles. The rail rate is 60 cents a ton, compared with a shipping cost of 30 cents per ton by barge.

Desiring to obtain an outlet in the St. Louis territory the company found rail rates against them. To overcome this disadvantage the company is building a new plant at Louisiana, Mo., which will enable shipment into the St. Louis territory by water at a saving of 50% in rates.

The company has placed four locomotive trains in service, loading and unloading their products from barges, and is now building four new barges at a cost of about $9000 each. More will be built soon, it was said. —*Kansas City (Mo.) Star.*

New Gravel Company to Operate at Montgomery, Ala.

ACCORDING to the Birmingham, Ala., *News*, W. L. Shepherd has purchased 151 acres of land, just outside of the northern limits of Montgomery, Ala., which he plans to develop for its gravel resources.

The property, known as the Abercrombie plantation, adjoins the land owned and operated by the Roquemore Gravel Co., the two tracts being divided by the Louisville and Nashville railroad. The consideration was given at approximately $20,000.

Mr. Shepherd, it was said, has plans under way for the organization of a company to erect and operate a modern sand and gravel plant on the site.

Reported Cut in Portland Cement Prices in Canada

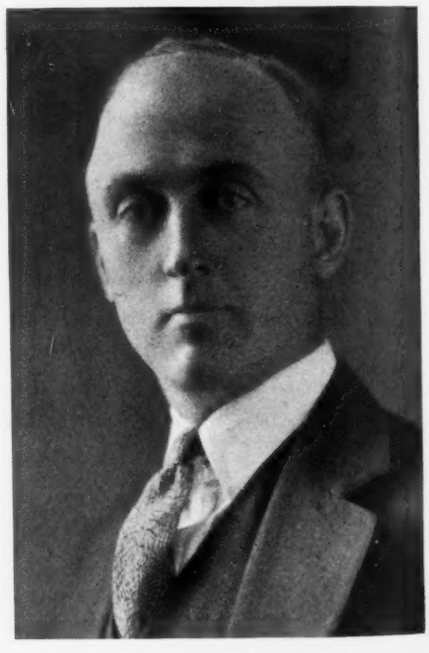
DIRECTORS of National Cement Co., Montreal, Que., have not yet made any statement relative to the cut of 30 cents a barrel in the price of cement announced by the Canada Cement Co. a short time ago. A newspaper reporter who has made a study of cement prices in recent years points out that the Canada Cement Co. has adopted its policy of reducing prices at competitive points since 1922, or at the time the Hochelaga Cement Co., now the National Cement Co., entered the field.

He quotes the following as net prices on cement per barrel at the mill, sales tax, freight and bags not included:

	Province	
Year	Ontario	Quebec
1921	$2.36	$2.53
1922	2.05	2.22
1923	1.78	2.00
1924	1.58	1.74
1925	1.52	1.69
1926	1.50	1.35

W. C. Bird Made Vice President of Rockland and Rockport Lime Corp.

WILLIAM C. BIRD was made vice-president of the Rockland and Rockport Lime Corp. at a meeting of the board of directors held recently in Boston. Officially Mr. Bird was designated "in charge of plant operation, and in charge of general manage-



W. C. Bird, new vice-president of the Rockland and Rockport Lime Co.

ment of the company in the absence of the president." Mr. Bird is a civil engineering graduate of the Massachusetts Institute of Technology and has been associated with the company for several years as general superintendent and chief engineer in charge of operations.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

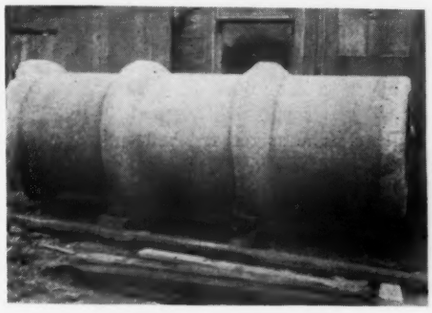
Cement Pipe Plant Run by Aggregate Producers

Owners of Oklahoma Glazed Concrete Pipe Company Use Materials from Their Own Sand Plant and Quarry

THE Oklahoma Glazed Concrete Pipe Co. operates one of the oldest cement products plants in the Southwestern states at Tulsa, Okla. At present its output is confined to making concrete pipe, but it is possible that it may add concrete block making to its activities in the near future.

One of the accompanying pictures shows three joints of this company's pipe which have been 15 years underground as part of the water supply system of Tulsa. They were dug up when changes in the line, due to the growth of the city, were being made. The pipe is in excellent condition, even better than when it was put down. It is so hard that it rings like a bell when struck by a hammer and it is an excellent illustration of what is meant by the Portland Cement Association's slogan: "Concrete for Permanence." Undoubtedly another 15 years of service would have had no effect upon this pipe except perhaps to harden it a little more. This is especially interesting because the pipe was laid in a section of the country where the opponents of concrete pipe have said it was liable to disintegrate.

The company makes all sizes of pipe up to 36-in. diameter. The smaller pipes are made on a machine, the larger by air-hammer tamping into molds. Both methods make pipe which is of equal strength. The reason why hand methods are used for the larger sizes is purely one of convenience in manufacture.



Portion of a water main in use at Tulsa, Okla., for 15 years. The pipe will stand 32 lb. pressure and is now harder than the day it was put down

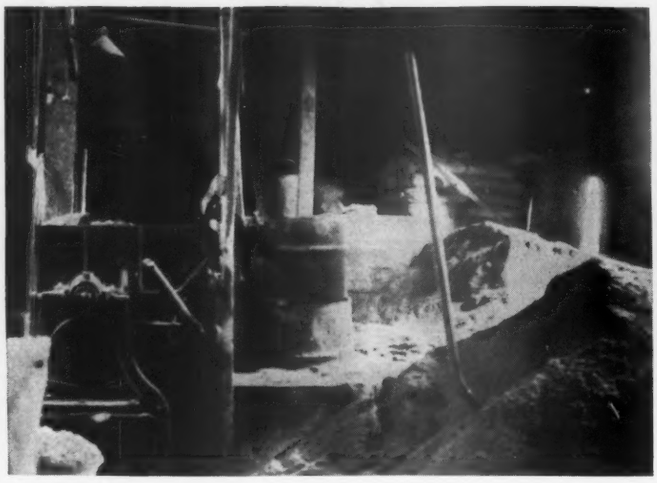
The machine is known as the Thomas pipe machine and the mold in which the pipe is formed is rotated. The part which forms the core stands still and the effect is to make a very smooth surface on the inside of the pipe, which is why the name of "glazed concrete pipe" is given it.

In making the larger pipe the mold and core are handled by a frame which is on casters so that it can be moved to any part of the room. A block and falls attached to the upper part of the frame enables the mold and the core to be lifted and placed as desired.

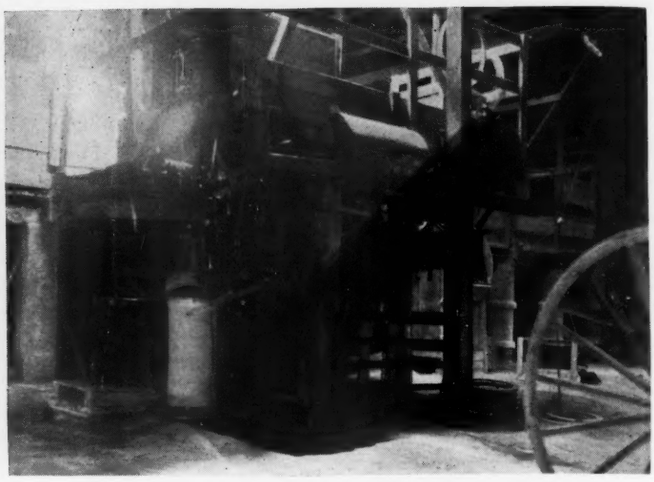
In making the larger pipes the mold and core are placed in position and concrete is rammed between the two with rammers made by the Chicago Pneumatic Tool Co.

Concrete pipe curing in the yard of the Oklahoma Glazed Concrete Pipe Co., Tulsa

Three of these 36-in. pipe are joined by smaller pipes to make a septic tank

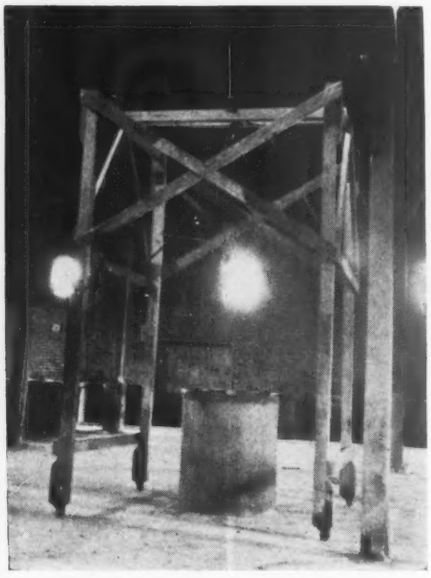


The mixer and the platform for aggregates



Machine used for making smaller sizes of pipe

These are much like a riveting hammer or pneumatic chisel in their action, striking several blows a second and thoroughly consolidating the concrete in the mold.



Larger sizes of pipe are molded by hand. Tamping is done by a pneumatic hammer. The molds are handled by the frame shown

With both hand and machine-made pipe, the molds may be stripped as soon as the pipe has been formed, the green concrete is so firm. The green pipe are cured in the ordinary way for sufficient time to harden them enough so that they can be removed to the yard where the curing is completed.

Mixing for both machine and hand molding is in a Blystone mixer which is installed above the machine. A 1:3 mix is employed and the aggregate is a mixture of sand and fine stone with a little stone screenings. The addition of the screenings has been found to make the pipe more impermeable to moisture.

The pipe has to stand at least 32 lb. continued water pressure without showing any leakage. The spigot and bell ends are very carefully cast and finished so that they fit well and when the two are united with a portland cement mortar they make a joint that will stand all the pressure that the pipe will stand.

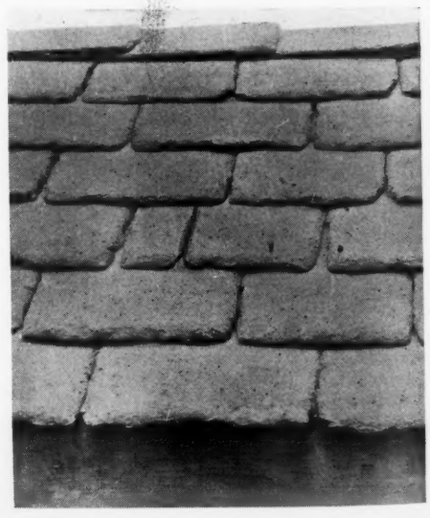
A considerable portion of the output is of 36-in. pipe which is cast with holes into which smaller pipes are cemented to make septic tanks. Three of these large pipes joined by smaller pipes make a unit which will handle the sewage from an ordinary household. The effluent that flows away is free from objectionable bacterial compounds. These septic tanks are sold for use on farms and in the smaller towns in which no sewerage system has been installed.

The owners of the Oklahoma Glazed Concrete Pipe Co. operate a stone quarry, as the Hughes Stone Co., and a sand plant, as the Price Sand Co. Hence they produce their own aggregates. The office of the company is in the Mayo building, Tulsa, Okla.

Plant of the Oklahoma Glazed Concrete Pipe Co. at Tulsa, Okla.

Tapered Cement-Asbestos Shingles

BEAUTY is added to utility in a new kind of asbestos shingle, tapered in thickness, now being placed on the market by the Asbestos Shingle, Slate and Sheathing Co., Ambler, Penn.



Section of a roof made of "English Thatch" type of tapered asbestos-cement shingles

These shingles are made in two styles, the "English Thatch." or rough type, in random widths, and the smooth, or "Colonial" type, which also can be supplied in random widths and with butts broken, if desired. Both types are made in various colors, making

possible innumerable combinations of color and "tapestry" effects, and giving the architect a new medium of expression in the treatment of roofs. The shingles are fireproof and said to be quite resistant to weather exposure, particularly ice and frost. The colors are said to be non-fading mineral colors incorporated in the body of the shingle.

Model Home Built Almost Entirely of Rock Products

A HOME that is proof against fire, flood, rats, earthquakes, insects, vermin, tornadoes, sweating and uneven temperature may sound like a dream, but it's a "concrete" fact, according to Robert L. Day, dean of Huntington architects and builder of the first house of its kind in the world.

A model home has recently been built almost entirely from rock products. Mr. Day, the patentee of the process and construction rights for this type of building, says that it is a boon to home builders who live in areas subject to visitations of floods, tornadoes and earthquake. It is said that the cost of erection of such a five-room home, which is concrete throughout, excepting doors and windows, is no more than the cost of building the ordinary type of bungalow. Concrete, gypsum, insulex, plaster of paris and terrazzo are the chief building materials in the new home. The only woodwork is in the doorways, while steel casements are used to frame the plate and prism glass windows.

The outside walls are built of pre-cast concrete made at the Day factory at Huntington. "The floors are made from concrete slab on which concrete has been poured and the insulex treatment will resist cold, keeping an even temperature. Terrazzo or compolite will be used as a finish for the floors.

"All picture moulds, lighting moulds and mantels are of plaster paris, the first, I believe, of their kind, troweled to a smooth, artistic finish.

"No insurance is required on such a home, and the number of electrical attachments, lights, etc., are unlimited, as nothing can burn. In the bathroom we use Keene's cement, which will resist water stains.

"The entire house may be cleaned simply by moving the furniture, rolling up the rugs and going to work with a bucket of water," Mr. Day said.—*Huntington (W. Va.) Herald-Dispatch.*

Canadian Concrete Products Association Elects Officers

AT a recent meeting of the Concrete Products Association of Canada held at the King Edward hotel, W. H. Edwards, M. P. P. (member of the Ontario provincial parliament), Toronto, and president of the Ontario Concrete Products Co. of Woodbridge, Ont., was elected president of the association. The other officers elected were: First vice-president, F. J. Kinzinger, Windsor; second vice-president, W. H. Kelk, Toronto; treasurer, C. R. Christie; secretary, W. H. Thompson; directors: George Lawrence, Stoney Creek; L. Wookey, Toronto; T. W. Bishop, Ridgeville; Wm. Theaker, Hamilton, and R. J. McLelland, Kingston.

Shelton Sand and Gravel Company Installs Wet-Mix Concrete Plant

THE Shelton Sand and Gravel Co., which recently took over the sand and gravel plant of the Peninsular Railroad Co., near Shelton, Wash., has recently installed a ready wet-mix concrete plant.

The new plant comprises a 4-sack Koehring mixer in connection with the bunkers, arranged so that an accurate proportion of the raw materials, sand, gravel and cement can be supplied exactly for the purpose required, dumped into waiting trucks and rushed to the job. The trucks used in delivery are regular trucks made over with hopper bodies.

Local contractors have been well satisfied with the "Tru-Mix," as it is called, and it has been used for several house foundations and cement sidewalks about the town. In one instance a delivery was made over 19 miles away for use on a highway crossing.—*Shelton (Wash.) Journal.*

N. K. Wilson New Sales Manager of Waukesha Lime and Stone Company

THE WAUKESHA LIME & STONE CO., Waukesha, Wis., producers of sand, gravel and crushed stone and manufacturers of pulverized rock products, announces the appointment of N. K. Wilson as general sales manager, with headquarters at the new Milwaukee sales office at 3002 Plankinton building.

Mr. Wilson, formerly executive secretary of the Wisconsin Mineral Aggregate Association, is an associate member of the American Society of Civil Engineers and a graduate of the University of Illinois and has been active in the highway and building trades in Wisconsin for the past 12 years.

Firing Up New Cement Kiln a Regular Ceremony in England

THE CEREMONY of "lighting up the kiln"—in this case the biggest rotary kiln in the world—was performed at Bevan's Works, Northfleet, on Thursday (March 25), by Mr. P. M. Stewart, chairman of the Associated Portland Cement Manufacturers.

Mr. A. G. Davis, technical managing director of the company, in handing over the match, said that the event marked an important stage in the reconstruction of what would be the largest cement works in Europe.

The new kiln measures 250 ft. in length by 11 ft. 6 in. in diameter. Inside this immense tube a mass of old sleepers, soaked in paraffin, had been stacked, and in order to light this Mr. Stewart used a large wad of soaked tow attached to a 22 ft. pole. Within a few moments the flames were so intense that it become necessary to use colored glass in order to look into the kiln.

In a brief speech to the officials and men engaged in the work of reconstruction, Mr. Stewart expressed the thanks of the directors to all concerned and wished "Godspeed to Bevans." He hoped it would live up to their ambitions and the company's reputation.—*The Contract Journal (London, England).*

Pre-cast units used in construction of unusual homes, and (right) a model house constructed of these and other rock products

Traffic and Transportation

EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning April 12:

Central Freight Association Docket

12792—(2) **Gravel and sand**, except blast, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica, carloads, Dundee, Ind., to points in Indiana.

(In cents per ton of 2000 lb.)

To—	Proposed rate	Present rate
Brice	80	Sixth
Portland	75	88
Muncie	60	72
Cammack	60	69
Hobbs	60	69
Tipton	60	69
Indianapolis	80	88
Malott Park	80	88
Castleton	80	88
Jacksons	65	70
Sharpsville	65	72
Fairfield	65	72
Kokomo	65	72
Bunker Hill	80	88
Peru	80	88
Doyle	90	Sixth
Denver	90	Sixth
Deeds	90	Sixth
Macy	90	Sixth
Rochester	90	Sixth
Tiosa	95	Sixth
Walnut	95	Sixth
Argos	95	Sixth
Plymouth	100	Sixth
Mollies	60	Sixth
Hartford City	70	72
Eaton	70	72
Shidelers	70	72
Royerton	70	72
Whitely	70	72
Industry	60	65
Cowan	70	72
Oakville	70	72
Springport	70	72
Mt. Summit	70	72
Rhein	70	72
New Castle	70	72
New Lisbon	80	Sixth
Cambridge City	80	Sixth
Milton	85	Sixth
Beesons	85	Sixth
Connersville	85	Sixth
Spiceland	85	Sixth
Dunreith	85	Sixth
Mays	85	Sixth
Sexton	85	Sixth
Rushville	85	Sixth
Bluffton	80	Sixth
Poneto	80	Sixth
Keyston	80	Sixth
Montpelier	80	Sixth

12796 (cancels White D. A. No. 12734—2)—(a) **Gravel and sand**, other than blast, engine, foundry, glass, molding or silica, carloads.

(b) **Sand**, blast, engine, foundry, glass, molding or silica, carloads, from Erie, Penn., Ashtabula and Ashtabula Harbor, Ohio, to points in Pennsylvania, present and proposed rates, from:

Erie, Penn.

To—	Proposed A	Proposed B	Present A	Present B
Butler, Penn.	160	176	*†205	225
Bessemer, Penn.	160	176	175	189
Carnegie, Penn.	160	176	175	189
Clairton, Penn.	160	176	175	189
Duquesne, Penn.	160	176	†175	189
Homestead, Penn.	160	176	175	189
McKeesport, Penn.	160	176	175	189
Munhall, Penn.	160	176	175	189
New Kensington, Penn.	160	176	§18	18
Pittsburgh, Penn.	160	176	175	189
Brackenridge, Penn.	160	176	‡18	18
Ashtabula and Ashtabula Harbor				
Butler, Penn.	160	176	§17	17
Bessemer, Penn.	160	176	175	189
Carnegie, Penn.	160	176	175	189
Clairton, Penn.	160	176	175	189
Duquesne, Penn.	160	176	†175	189
McKeesport, Penn.	160	176	175	189
Munhall, Penn.	160	176	175	189
New Kensington, Penn.	160	176	§17	17
Brackenridge, Penn.	160	.....	§17	17

Rates in cents per ton of 2,000 lb.
(*) Rate via B. & L. E. R. R., (a) $1.25; (b) $1.39; B. & L. E., I. C. C. 853.
(†) Tariff authority G. O., I. C. C. 13749.
(‡) Sixth class rate.
(§) Sixth class rate.

12809—(2) **Gravel and sand**, except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica, in open top cars, carloads, Columbus, O., to Ohio.

To—	(2) Prop. rate	Pres. rate	
Sandusky	120c	16½c	(1)
New Cornerstown	100	14½	(1)
Carrothers	100	14½	(1)
Dennison	105	15	(1)
Burgoon	105	16	(1)
Unionville	65	10½	(1)
Piqua	95	100	(2)
Woodington	105	16	(1)
Toledo	120	17	(1)
Lima	110	15	(1)
Pataskala	60	70	(2)
Galena	70	80	(2)
Sunbury	70	80	(2)
Condit	70	80	(2)
Centerburg	70	80	(2)

(1) In cents per 100 lb. (6th class).
(2) In cents per net ton.

12813—(2) **Gravel and sand**, except blast, engine, foundry, filter, fire or furnace, glass, grinding or polishing, loam, moulding or silica, carloads, Terre Haute, Ind., to Illinois.

Present rate (per net ton) to:

Greer	94	Tallmadge	98
Hallock	94	Ahern	98
Stockland	94	Delmar	98
Cutmer	94	Puder	98
Darrow	94	Brock	98
Webster	94	Polk	98
Nelson	94	Judy Siding	98
Hooper	98	Faithorn	98
North Hooper	98	Chicago Heights	98
Pembroke	98	Glenwood	98
Doney	98	Thornton	98

Proposed: 90c per net ton.

12816—(2) **Gravel and sand**, except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding and silica, carloads, Winona Lake, Ind., to Lima, O. Present rate: 90c per net ton. Proposed: 80c per net ton.

12817—(2) **Gravel and sand**, except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding and silica, carloads, Kanauga District, viz.: Hobson, Middleport, Cheshire, Kanauga and Gallipolis, O., to Belpre, O. Present rate: 110c per net ton. Proposed: 100c per net ton.

12818—(2) **Gravel and sand**, except blast, filter, core, engine, fire or furnace, foundry, glass, grinding or polishing, loam, moulding and silica, carloads, Winona Lake, Ind., to Mexico, Ind. Present rate: 13c. Proposed: 80c per net ton.

12840—(2) **Crushed stone**, C. L., Melvin and Lima, O., to Coney Island, Foresville, Bethel, Russellville and Felicity, O.

To—	—From Melvin, O.— Pro. Rate Cents	Pres. Rate Cents
Coney Island, O.	110	120
Forestville, O.	120	130
Bethel, O.	120	130
Russellville, O.	130	140
Felicity, O.	130	140

To—	—From Lima, O.— Pro. Rate Cents	Pres. Rate Cents
Coney Island, O.	130	140
Forestville, O.	140	150
Bethel, O.	140	150
Russellville, O.	150	160
Felicity, O.	150	160

12841—(2) **Crushed stone**, carloads, Carey, O., to Johnstown, O. Present rate: 100 cents per net ton. Proposed: 95 cents per net ton.

12842—(2) **Sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica), and gravel, carloads, Dayton to South Solon, O. Present rate: 13 cents. Proposed: 80 cents per net ton.

12843—(2) **Sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica), and gravel, carloads, Rush Run, O., to points in Ohio.

To—	*Proposed Rate	Present Rate
Elmore	140	21c per 100 lb. (6th class)
Findlay	140	(1) 180c per net ton
Fostoria	140	21½c per 100 lb. (6th class)
Medina	130	18c per 100 lb. (6th class)
Upper Sandusky	140	160c per net ton

*Rate in cents per ton of 2,000 lb.
(1) Intermediate from Bellaire, O.

12844—(2) **Sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica), and gravel, carloads, Dayton and Middletown, O., to Ohio.

To—	From Dayton, O. *Pro. Rates	Pres. Rates
(C. I. & W. Stations)		
McGonigle, O.	85	12
Woods, O.	85	12
Oxford, O.	85	13½
College Corner, O.	85	13½
(Pa. R. R. Stations)		
Seven Miles, O.	85	13
Collinsville, O.	90	13
Somerville, O.	90	13
Flockton, O.	85	13
Port Union, O.	85	13
Rialto, O.	85	13
Cresentville, O.	85	13
Grainthorpe, O.	85	13½

To—	From Middletown, O. *Pro. Rates	Pres. Rates
(C. I. & W. Stations)		
McGonigle, O.	75	10
Woods, O.	75	10
Oxford, O.	75	11½
College Corner, O.	75	11½
(Pa. R. R. Stations)		
Seven Miles, O.	80	10½
Collinsville, O.	90	10½
Somerville, O.	90	10½
Flockton, O.	75	10
Port Union, O.	75	10
Rialto, O.	75	10
Cresentville, O.	75	10
Grainthorpe, O.	75	11½

*In cents per net ton.

12847. **Stone, viz., rip rap, rough building (not cut to dimension), rough quarried, rubble and spawls, carloads, Flaggy Meadow, W. Va.**, to Pennsylvania. Present rates: As shown in Exhibit A attached; proposed rates, as illustrated in Exhibit A attached.

EXHIBIT A.

Illustrations.
From Flaggy Meadow, W. Va.

To Penn.	Prop. rates (In cents per ton of 2000 lb.)	Pres. rates (In cents per 100 lb.)
Pittsburgh	176	20½
Homestead	176	20½
McKeesport	176	20½
Brownsville	176	20½
Belle Vernon	164	19
California	164	15½
Canonsburg	202	21½
Montour Junction	202	21½
Monaca	227	21½
New Brighton	227	21½
Connellsville	202	15½
Jeanette	189	20½
Vandergrift	227	20½

12849. **Sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica), and gravel, carloads, East Liverpool, Ohio, to Snodes, Ohio. Present rate, 90 cents per ton of 2000 lb.; proposed, 85 cents per ton of 2000 lb.

12852. **Sand**, blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica, carloads, Rush Run, Ohio, to Indiana, Illinois, Wisconsin and Michigan. Present and proposed rates as shown in Exhibit B attached.

EXHIBIT B.

Rush Run, Ohio
(Rates in cents per ton of 2000 lb.)

To	Pro. rate	Pres. rate
Allegan, Mich.	292	315
Alma, Mich.	292	315
Alpena, Mich.	442	517
Bay City, Mich.	292	315
Cadillac, Mich.	382	454
Carsonville, Mich.	352	403
Cheboygan, Mich.	242	517

To	Rush Run, Ohio (Rates in cents per ton of 2000 lb.) Pro. rate	Pres. rate
Copemish, Mich.	382	454
Detroit, Mich.	189	202
East Tawas, Mich.	382	428
Farwell, Mich.	362	428
Frankfort, Mich.	382	454
Grand Rapids, Mich.	292	315
Harbor Beach, Mich.	352	403
Holland, Mich.	292	315
Howard City, Mich.	382	454
Ionia, Mich.	292	315
Lapeer, Mich.	252	315
Ludington, Mich.	382	454
Mackinaw City, Mich.	442	517
Manistique, Mich.	442	517
Muskegon, Mich.	292	315
Petoskey, Mich.	442	517
Reed City, Mich.	382	454
Evansville, Ind.	341	391
Mason City, Ill.	328	340
Neponset, Ill.	341	365
New Holland, Ill.	328	378
Rochelle, Ill.	315	365
Sycamore, Ill.	302	353
Milwaukee, Wis.	292	315

12853. **Crushed stone,** carloads, Foraker, Ohio, to stations on the Erie and Chicago & Erie railroads. Present rates, as per Erie railroad tariffs I.C.C. A6040 and I.C.C. A6688 and C.F.A.T.B. Tariff I.C.C. 940; proposed, as shown in Exhibit C attached.

EXHIBIT C.

To	From Foraker, Ohio Pro. rate cents	Pres. rate cents
Lisbon, Ohio	160	400
Burghill, Ohio	150	400
Cortland, Ohio	150	400
North Warren, Ohio	150	400
Youngstown, Ohio	150	400
Warren, Ohio	150	400
Garrettsville, Ohio	110	390
Cleveland, Ohio	90	340
Braceville, Ohio	110	370
Ravenna, Ohio	100	370
Kent, Ohio	100	360
Akron, Ohio	90	340
Barberton, Ohio	90	340
Silver Creek, Ohio	90	340
Wadsworth, Ohio	90	340
Rittman, Ohio	90	330
Sterling, Ohio	90	330
Creston, Ohio	90	330
Burbank, Ohio	90	320
West Salem, Ohio	80	300
Polk, Ohio	80	300
Nankin, Ohio	80	300
Ashland, Ohio	80	300
Milton, Ohio	80	290
Pavonia, Ohio	80	280
Summit, Ohio	80	280
Mansfield, Ohio	75	270
Ontario, Ohio	75	270
Galion, Ohio	75	260
Martel, Ohio	75	260
Caledonia, Ohio	75	240
Slicks, Ohio	75	230
Marion, Ohio	70	90
Green Camp, Ohio	75	90
Codding, Ohio	75	90
Woodland, Ohio	75	90
Richwood, Ohio	75	90
Claiborne, Ohio	75	90
Broadway, Ohio	75	90
Peoria, Ohio	75	90
Pottersburg, Ohio	80	90
North Lewisburg, Ohio	80	90
Mingo, Ohio	80	90
Kennard, Ohio	80	90
Kings Creek, Ohio	80	90
Urbana, Ohio	80	90
Bowlusville, Ohoi	80	90
Maitland, Ohio	80	90
Sugar Grove Hill, Ohio	80	90
Espyville, Ohio	70	90
DeCliff, Ohio	65	90
Hepburn, Ohio	60	70

12878. **Gravel and sand, except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica,** carloads, Ft. Jefferson, Ohio, to Dull, Shumm and Wiltshire, Ohio, also Pleasant Mills and Decatur, Ind. Present rate, $1.00 and $1.01 per net ton, respectively; proposed, 90 cents per net ton.

12868. **Stone, rip-rap,** carloads, Osgood, Ind., to Broad Ripple, Ind. Present rate, 16½ cents; proposed, $1.30 per net ton.

12854. **Crushed stone,** carloads, Kankakee, Lehigh, Van's Siding, West Kankakee and Chicago, Ill., to points in Indiana.

(N.Y.C.R.R.) To	From Kankakee, Lehigh, Van's Siding, West Kankakee, Ill. (Rates in cents per net ton) Proposed	Present
Shelby, Ind.	69	76
Wheatfield, Ind.	69	76
San Pierre, Ind.	75	88
North Judson, Ind.	75	95
Knox, Ind.	85	100
Hamlet, Ind.	85	100

(N.Y.C.R.R.) To	From Kankakee, Lehigh, Van's Siding, West Kankakee, Ill. (Rates in cents per net ton) Proposed	Present
Walkerton, Ind.	90	101
North Liberty, Ind.	90	101
Porter, Ind.	90	92
Chesterton, Ind.	90	92
Otis, Ind.	90	92
La Porte, Ind.	90	95
New Carlisle, Ind.	90	101
South Bend, Ind.	90	101
Mishawaka, Ind.	90	101

(N.Y.C.R.R.) To	Chicago, Ill. (Rates in cents per net ton) Proposed	Present
Shelby, Ind.	85	95
Wheatfield, Ind.	85	100
San Pierre, Ind.	85	100
North Judson, Ind.	85	100
Knox, Ind.	85	100
Hamlet, Ind.	85	100
Walkerton, Ind.	90	101
North Liberty, Ind.	90	101
Porter, Ind.	90	92
Chesterton, Ind.	90	92
Otis, Ind.	90	92
La Porte, Ind.	90	95
New Carlisle, Ind.	90	101
South Bend, Ind.	90	101
Mishawaka, Ind.	90	101

12876. **Sand** (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and gravel, carloads, Harbor Bridge, Penn., to Pennsylvania. From Harbor Bridge, Penn. (In cents per net ton.)

To—	Proposed	Present
Albion	125	.....
Aspinwall	115	160
Beaver	90	.....
Bessemer	115	125
Bridgeville	115	.....
Burgettstown	140	.....
Carnegie	115	125
Donora	160	.....
East Pittsburgh	115	160
Fetterman	90	.....
Freedom	90	.....
Hillsville	90	.....
Homewood Junction	90	.....
Leetsdale	105	.....
Linesville	105	.....
McDonald	105	.....
Marianna	160	189
Midland	90	.....
Munhall	115	.....
New Galilee	90	.....
Pittsburgh	115	125
Sewickley	115	.....
South Oil City	125	.....
Vanport	90	.....
Volant	90	.....
Verona	115	.....
Warren	140	151
Wilmerding	125	.....
Wilmington Junction	90	.....

12928—**Lime,** carloads, Scioto and White Sulphur, Ohio, to Rock Island, Ill. (proper). Present rate, 27½ cents; proposed, 25 cents.

12929—**Crushed stone,** in bulk, in open top cars, carloads, Centerville, Ohio.

To—	Proposed‡	Present
Newton, Ohio	85	14*
Perintown, Ohio	90	15*
Batavia, Ohio	90	15*
Afton, Ohio	95	15*
Williamsburg, Ohio	95	16½*
Eastwood, Ohio	100	16½*
Mt. Orab, Ohio	100	16½*
Sardinia, Ohio	100	16½*
Macan, Ohio	105	18*
Winchester, Ohio	105	18*
Seaman, Ohio	105	110†
Lawahe, Ohio	115	18*
Peebles, Ohio	115	18½*
Mineral Springs, Ohio	115	18½*
Rarden, Ohio	115	18½*
Otway, Ohio	125	120†
Henley, Ohio	125	18½*
McDermott, Ohio	125	18½*
Portsmouth, Ohio	125	18½*

*Rate in cents per 100 lb. (6th class).
†Rates in cents per net ton; P. R. R.
‡Cents per net ton.

12925 (Shippers Proposal)—**Molding sand,** carloads. Proposed to change 6th class rates from Ehrmandale, Ind., C. & E. I. Tariff No. 506, I. C. C. No. 171, and Seelyville, Ind., to the following cities:

Adrian, Mich., $2.52; Akron, Mich., $2.65; Akron, Ohio, $3.15; Albion, Mich., $2.52; Alton, Ill., $1.76; Anderson, Ind., $1.76; Ann Arbor, Mich., $2.52; Athens, Ohio, $3.15; Attica, Ind., $1.50; Auburn, Ind., $2.14; Auburn Junction, Ind., $2.14; Aurora, Ill., $2.27; Batavia, Ill., $2.27; Battle Creek, Mich., $2.52; Bay City, Mich., $2.65; Bedford, Ind., $1.64; Bellefontaine, Ohio, $2.52; Belleville, Ill., $1.76; Belvidere, Ill., $2.40; Benton Harbor, Mich., $2.27; Bloomington, Ill., $1.76; Bloomington, Ind., $1.64; Bluffton, Ind., $2.02; Bowling Green, Ohio, $2.52; Brazil, Ind., 88; Bremen, Ind., $2.14; Bristol, Ind., $2.27; Bryan, Ohio, $2.52; Burlington, Iowa, $2.65; Butler, Ind., $2.14; Cairo, Ill., $2.27; Cambridge City, Ind., $1.89; Canton, Ill., $2.27; Carmi, Ill., $1.60; Caro, Mich., $2.65; Celina, Ohio, $2.27; Champaign, Ill., $1.39; Chicago, Ill., $1.90; Chicago Heights, Ill., $1.90; Chillicothe, Ohio, $2.52; Cincinnati, Ohio, $2.02; Cleveland, Ohio, $3.15; Clinton, Ind., 88 cents; Clinton, Iowa, $2.65; Coldwater, Mich., $2.52; Coldwater, Ohio, $2.27; Columbia City, Ind., $2.02; Columbus, Ind., $1.76; Columbus, Ohio, $2.52; Connersville, Ind., $1.89; Converse, Ind., $1.89; Coulterville, Ill., $2.02; Crawfordsville, Ind., $1.26; Crown Point, Ind., $1.90; Danville, Ind., $1.26; Davenport, Iowa, $2.65; Dayton, Ohio, $2.27; Decatur, Ill., $1.51; Decatur, Ind., $2.02; Defiance, Ohio, $2.52; Delaware, Ohio, $2.52; Delphos, Ohio, $2.27; Deshler, Ohio, $2.52; Detroit, Mich., $2.52; Dixon, Ill., $2.40; Dowagiac, Mich., $2.52; Dubuque, Iowa, $2.65; Dundee, Mich., $2.52; DuQuoin, Ill., $2.02; Dwight, Ill., $1.90; East Moline, Ill., $2.65; Elwood, Ind., $1.76; Ft. Wayne, Ind., $2.02; Galena, Ill., $2.65; Grand Rapids, Mich., $2.52; Hannibal, Mo., $2.27; Holland, Mich., $2.52; Indiana Harbor, Ind., $1.90; Jeffersonville, Ind., $2.02; Kendallville, Ind., $2.14; Lafayette, Ind., $1.50; Lima, Ohio, $2.27; Lyons, Iowa, $2.65; Marion, Ind., $1.89; Metropolis, Ill., $2.27; Mishawaka, Ind., $2.02; Mt. Vernon, Ill., $1.76; Muskegon, Mich., $3.15; Noblesville, Ind., $1.76; Pana, Ill., $1.76; Plymouth, Ind., $2.02; Racine, Wis., $2.50; Rushville, Ind., $1.76; St. Louis, Mo., $1.76; Sidney, Ohio, $2.27; Springfield, Ohio, $2.27; Tecumseh, Mich., $2.52; Troy, Ohio, $2.27; Vincennes, Ind., $1.30 Waukegan, Ill., $2.50; Ypsilanti, Mich., $2.52.

12930—**Crushed stone,** crushed screenings and tailings (other than ground or pulverized agricultural limestone, ground or pulverized limestone, fluxing stone or raw dolomite, fire stone and silica rock or silica stone), carloads, Bluffton, Ind., to Fox's and La Fontaine, Ind. Route, N. Y. C. & St. L. R. R. (Clover Leaf District), Marion, Ind., C. C. C. & St. L. Ry. Present rate, $1.04 per net ton; proposed, 92 cents per net ton.

12934—**Gravel and sand** (except blast, engine, finishing, foundry, glass, loam, marl, molding and silica), carloads, Ambridge, Baden and Freedom, Penn., to Mammoth, Penn. Present rate, 17 cents; proposed, $1.25 per ton of 2000 lb.

12936 (2)—**Sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and gravel; carloads, Mt. Vernon, Ohio.

To—	(Rates in cents per net ton) Proposed	Present
Mansfield, Ohio	60	70
Alta, Ohio	60	70
Lexington, Ohio	60	70
Belleville, Ohio	60	70
Lockhart, Ohio	60	70
Gatton Rock, Ohio	60	70
Butler, Ohio	60	70
Ankenytown, Ohio	60	70
Fredericktown, Ohio	60	70
Columbus, Ohio	70	90
Shawnee, Ohio	80	100
McCuneville, Ohio	80	100
Bristol, Ohio	80	100
Junction City, Ohio	80	90
Gobles, Ohio	80	90
McElroy, Ohio	80	90
Somerset, Ohio	80	90
Chalfant, Ohio	80	90
Glenford, Ohio	80	90
Yost, Ohio	80	90

12942—**Crushed stone,** carloads, minimum weight 90% of marked capacity of car unless car is loaded to full cubical or visible capacity, in which case actual weight will govern, Putnamville, Ind., to Rockville, Ind.

Present rate—6th class rate of 13½c, per Agent Jones' I. C. C. 938. Proposed—$1.00 per net ton.

12945—**Gravel and sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica), carloads, in open top cars, minimum weight 90% of marked capacity of car, except when car is loaded to full cubical or visible capacity actual weight will apply, Columbus, Ohio, to Florence and South Charleston, Ohio.

Present rate—70c per net ton. Proposed—60c per net ton.

12952—**Sand,** other than blast, engine, foundry, glass, molding or silica, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to full cubical or visible capacity actual weight will apply, Toledo, Ohio, to Muskegon, Mich.

Present rate—There is no commodity rate in effect today via the Grand Trunk Ry. or Pennsylvania R. R.; via the Pere Marquette Ry. the rate of $2.10 published to Pentwater, Mich., is applicable under the intermediate clause; proposed, $1.90 per net ton.

12953 (2)—**Gravel and sand,** except blast, engine, foundry, glass, loam, marl, molding and silica, carloads, Macksville, Ind., to Greenup, Ill. Present rate, 84 cents per net ton; proposed, 73 cents per net ton.

12948—**Gravel and sand,** except blast, engine, foundry, glass, loam, marl, molding and silica, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to full cubical or visible capacity actual weight will apply, Columbus, Ind., to Blocher, Ind.
Present rate—12c. Proposed—90 per net ton.

12949—**Crushed stone,** carloads, minimum weight 90% of marked capacity of car, except when car is loaded to full cubical or visible capacity actual weight will apply, Norlo, Ohio, to points in Ohio. (Illustrations.)

To—	Proposed Rate	Present Rate	Mileage
Andover	130	150	165
Bolivar	105	120	113
Braceville	125	140	138
Carrollton	120	140	147
Chardon	100	120	125
Charlestown	125	140	140
Coshocton	120	140	149
Freeburg	120	140	151
Harmon	90	110	106
Jefferson	130	150	151
Justus	100	120	107
Minerva	120	140	139
Navarre	90	110	118
Oneida	120	140	137
Shelby	75	90	45
Sherrodsville	120	140	131
Valley Junction	115	140	120
Williamsfield	135	150	170
West Farmington	100	140	146

12965—**Crushed stone,** crushed stone screenings and articles taking same rate, carloads, Bluffton, Ind., to

To—	Mileage	Proposed rate	Present rate (see note)
Medford, Ind.	46.8	85	100
Blountsville, Ind.	53.1	90	100
Losantville, Ind.	57.0	90	100
Thornburg, Ind.	61.2	95	100
Economy, Ind.	63.9	95	100
Williamsburg, Ind.	69.6	95	100

Note—Present is the Richmond, Ind., rate.

12967—**Agricultural limestone,** in bags or bulk, in box cars, carloads, minimum weight 80,000 lb., Woodville and Gibsonburg, Ohio, to points in Michigan. Present rates, 60% of 6th class; proposed rates, as follows:

	Per net ton. Proposed rate		Per net ton. Proposed rate
Adrian	$1.30	Imlay City	$1.65
Allegan	1.80	Jackson	1.50
Alma	1.85	Jonesville	1.50
Ann Arbor	1.35	Kalamazoo	1.70
Ashley	1.75	Lansing	1.60
Badaxe	1.90	Lapeer	1.65
Battle Creek	1.65	Manchester	1.40
Bay City	1.75	Monroe	1.25
Benton Harbor	1.85	Muskegon	2.00
Carsonville	1.90	Niles	1.75
Cassopolis	1.75	Owosso	1.60
Chelsea	1.45	Oxford	1.60
Chesterfield	1.55	Plymouth	1.40
Coldwater	1.55	Pontiac	1.55
Detroit	1.40	Port Huron	1.65
Durand	1.60	Rochester	1.55
Flint	1.60	Romulus	1.35
Fostoria	1.70	St. Joseph	1.85
Grand Haven	2.00	Saginaw	1.70
Grand Rapids	1.80	South Haven	1.80
Grindstone City	2.00	Sturgis	1.65
Grosvenor	1.25	Tecumseh	1.30
Hastings	1.70	Three Rivers	1.70
Hillsdale	1.45	Vassar	1.70
Holland	1.90	Wasepi	1.65
Holly	1.55	White Pigeon	1.65
Howard City	1.90	Wixom	1.50
Howell	1.50	Ypsilanti	1.40

Illinois Freight Association Docket

3570. **Sand and gravel,** from East St. Louis, Ill., to various points in Illinois on the B & O. railroad.

(Rates in cents per net ton.)

To— (Representative points)	Present	Proposed
O'Fallon	88	88
Lawrenceville	(1)	113
Springfield	126	120
Taylorville	126	118
Altamont	126	113

(1) No commodity rates at present; class rates or lowest combination applies.

3575. **Sand,** carloads, from Keithsburg, Ill., to Peoria, Ill. Rates in cents per net ton. Proposed, 88 cents.

3616—**Stone, ground or pulverized** (in bulk), crushed or rough, quarried, in straight or mixed carloads, minimum weight 90% of the marked capacity of the car, except when cars are loaded to full cubical or visible capacity, actual weight will apply, but not less than 40,000 lb. (not subject to Agt. B. T. Jones' Combination Freight Trf. No. 228, I. C. C. No. US1) from Columbia Quarry No. 2 and Krause, Ill., to C. B. & Q. R. R. stations, viz., Rock Creek, Ursa, Mendon and Loraine, Ill. Present—Class or combination rates, whichever produces lower charge, apply on Illinois intrastate traffic; class rates apply on interstate traffic. Proposed—$1.49 per ton of 2,000 lb.

1008-A—**Sand and gravel,** carloads, from Forreston and Rockford, Ill. Rates in cents per ton of 2,000 lb.:

To	Present	Proposed
C. G. W. R. R. stations, viz.:		
Elizabeth, Ill.	108	103
Aiken, Ill.	113	103
Galena Junction, Ill.	113	103
Hanover Ry.		
Hanover, Ill.	130	120

3615—**Stone, crushed,** carloads, from Chicago and Chicago District points to stations on Wabash Ry. in Illinois. Rates per net ton:

To (Representative Points)	Present	Proposed
Essex, Ill.	1.01	.88
Voorhies, Ill.	1.39	1.26
Wyckles, Ill.	1.13	1.01
Curran, Ill.	1.26	1.01
Jacksonville, Ill.	1.39	1.26

3619—**Sand and gravel,** carloads, from Muscatine, Ia., to Warsaw, Ill. Present—Class E. Proposed—Rate per ton, 1.26.

3620—**Stone, crushed,** in open cars; agricultural limestone, unburned, in open cars; and stone screenings, in open cars; minimum carload weight 90% of marked capacity of car except when car is loaded to full cubical or visible capacity, actual weight will apply, from East St. Louis and Falling Springs, Ill. Rates per net ton:

To (Representative points)	Present	Proposed
Exermont, Ill.	76	65
Highland, Ill.	85	65
Pierron, Ill.	85	70
Stubblefield, Ill.	85	75
Funkhouser, Ill.	97	90

3636—**Sand** (except foundry, glass, molding or silica) and gravel, carloads, from Lincoln, Ill., to C. C. C. & St. L. Ry. stations, Gillum to Champaign, Ill., inclusive. Rates in cents per net ton. Present—147. Proposed—95.

Southern Freight Association Docket

26103 (shipper). **Calcite.** It is proposed to establish a through rate of $8.28 per ton, 2240 lb. on calcite (ground limestone), carloads, minimum weight 60,000 lb., from Cartersville, Ga., to Mystic, Conn., Stoughton, Brockton, South Braintree, Franklin, Taunton and Avon, Mass., and to other New England points where present rate of $8.89 per ton 2240 lb. is published in Agent Glenn's I.C.C. A-502. The proposed rate is the same as currently in effect to Boston, Mass., and is proposed in lieu of rate of $8.89 per ton 2240 lb., or combination rates to points to which no through rates are now in effect.

26116 (shipper). **Crushed stone,** carloads, minimum weight 90% of marked capacity of car, except that when car is loaded to cubical or visible capacity, actual weight will apply, from Boscobel and Harris Siding, Va., to Columbia, N. C., Edenton, N. C., and Morehead City, N. C. Combination rates now apply. Proposed: To Columbia, $2.05; Edenton, $1.78; Morehead City, $2.18 per net ton, made on a more relative basis with the rates in effect to Elizabeth City, N. C., distance considered.

26119 (carrier). **Lime,** common, hydrated, quick or slacked, straight or mixed carloads, minimum weight 30,000 lb., from Glens Falls, N. Y., to Thomaston, Ga. Present rate, 72 cents per 100 lb. (Class "A"); proposed, 54 cents per 100 lb., based on Cincinnati, Ohio, combination.

26140 (shippers). **Sand and gravel,** carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from Saffold, Ga., to Jasper and Live Oak, Fla. Reduced rates are proposed, as follows: To Jasper, $1.40; Live Oak, $1.44 per net ton, made on a basis of the carriers' proposed Georgia single-line scale, less 10%.

26152 (shipper; rates suggested by carrier). **Stone,** broken or crushed, carloads, minimum weight 90% of the marked capacity of the car, except when cars are loaded to their visible capacity actual weight shall govern, from Mt. Vernon and Sparks Quarry, Ky., to Shelby City, Ky. Present rate, 90 cents per net ton; proposed: From Mt. Vernon, 72; Sparks Quarry, 77 cents per net ton, based on the proposed Georgia-Alabama single line scale of trunk lines, other than the L. & N. railroad, less 10%.

26163 (shipper; rate suggested by carriers). **Limestone or marble,** ground or pulverized, carloads, minimum weight 33½ net tons, from Knoxville, Mascot and Strawberry Plains, Tenn., to East Point, Ga. Present rate, $1.92 per net ton; proposed, $1.71 per net ton, plus switching charge $1.13 cents per car at Atlanta, Ga.; same as rate in effect from Buquo and Hot Springs, N. C.

26169 (shippers). **Sand** (except glass or molding sand), carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern, from Cape May, N. J., to North Carolina points. It is proposed to establish the following reduced rates: To Greensboro, $5.20; Kannapolis, Yadkin and Concord, $5.40 per net ton, based on Norfolk, Va., combination.

26208 (carriers)—**Lime.** It is proposed to correct typographical error in rates on agricultural lime, carloads, from N. & W. Ry. Virginia kilns as shown in N. & W. Ry. I. C. C. No. 7881, to Greenville, N. C., present rate being $3.04; proposed rate, $3.49 per net ton. Rates from Southern Ry. kilns (their I. C. C. A9721), C. & O. Ry. kilns (their I. C. C. 9460) and Virginian Ry. kilns (their I. C. C. 1494), to be made the same. Rates from all of these kilns to New Bern, N. C., to be made $2.93, and to Almeta, Stevenson, Neuses, Enterprise and Oaks, N. C., to be made $3.49 where now lower.

26211 (shipper)—**Stone, crushed.** It is proposed to establish commodity rates on stone, broken, crushed, ground or pulverized, carloads, minimum weight per car 90% of marked capacity of car, except when car is loaded to full cubical or visible capacity, actual weight will apply, from Ohio River crossings and Memphis, Tenn., on traffic originating in southeastern and Carolina territories to Missouri River crossings, to be the same as rates on ground limestone from and to the origins and destinations involved. At the present time class rates apply.

26277 (shipper; rates suggested by carriers)—**Sand and gravel,** carloads, usual description and minimum weight, from Louisville, Ky., to Midway, Ky., and from Carrollton, Ky., to Frankfort, Ky. It is proposed to establish the following reduced rates: From Louisville to Midway, $1.04 per net ton, same as in effect to Lexington, Ky.; from Carrollton to Frankfort, Ky. (intrastate only), $1.00 per net ton, based 10 cents per ton over rate from Louisville, Ky.

26309 (shipper)—**Limestone,** ground or pulverized, carloads, minimum weight marked capacity of car, except when cars are loaded to full visible capacity, actual weight will apply, from Ladds, Ga., to Wetumpka, Ala. Combination now applies. Proposed, $1.94 per net ton, made on basis of the proposed Georgia Joint Line scale, less 10%.

Western Trunk Line Docket

1646-C—**Lime,** carloads, from Savanna, Ill. (proportional), to Cedar Rapids, Ia. Rate: Present—7 cents per 100 lb. (proportional Class C rate from Sabula, Ia., on which rates from stations east of Ill.-Ind. state line now based). Proposed—4 cents per 100 lb. Min. wt., 30,000 lb. (By shipper.)

5313—**Stone, crushed or broken,** carloads, from Kansas City and St. Joseph, Mo., to points in Kansas (for single line application). Present—Various scales apply as shown in various tariffs. Proposed—A mileage scale of rates for single line application, of which the following is representative:

	Proposed
40 miles and less	3½ cents
100 miles and over 90	6 cents
160 miles and over 145	7½ cents
250 miles and over 225	9½ cents
400 miles and over 375	12 cents
500 miles and over 475	14 cents

All scales in conflict therewith to be cancelled.
Minimum weight 90% of marked capacity of car, except that when weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity of car, the actual weight will apply, but in no case will the minimum weight be less than 40,000 lb.

Southwestern Freight Bureau Docket

7902 (1). **Oyster shells,** from points in Louisiana to points in Iowa. To establish a rate of 38½ cents per 100 lb. on oyster shells, crushed or ground, or uncrushed or unground, carloads, minimum weight 50,000 lb., from Berwick, Houma, and Morgan City, La., to Manning and Guthrie Center, Iowa. It is desired to establish from the Louisiana points mentioned above the same rate as is applicable from New Orleans.

7931 (1). **Sand and gravel,** from Richards Spur, Okla., to Texas points. To establish rate of 6½ cents per 100 lb. to Tolbert and Chillicothe, Texas, and rate of 7 cents per 100 lb. to Evans, Quanah, Acme and Goodlet, Texas, on sand, common, gravel and stone, crushed in straight or mixed carloads, minimum weight marked capacity of car, except when car is loaded to actual visible capacity, actual weight shall govern, but in no case less than 50,000 lb. from Richards Spur, Okla. Proposed rates, it is stated, are based on Shreveport scale the same as was approved from Richards Spur, Okla., to Henryetta, Dick Worsham and Bellevue, Texas.

7969—**Lime,** from points in Arkansas to points in Kansas. To establish the following rates in cents per 100 lb. on lime, carloads, minimum weight 30,000 lb., from Limedale Spur and Ruddells, Ark., to points shown below:

To—	Rate	To—	Rate
Olds, Kan.	17½	Walnut, Kan.	17½
Louisburg, Kan.	17½	St. Paul, Kan.	17½
Somerset, Kan.	17½	Sou. Mound, Kan.	17½
Glen Park, Kan.	17½	Parsons, Kan.	14
Ronald, Kan.	17½	Montana, Kan.	14
Hiattville, Kan.	17½	Sherman City, Kan.	14
Hepler, Kan.	17½		

To—	Rate	To—	Rate
Star Valley, Kan.	14	Carmeon, Kon.	20½
W. Mineral, Kan.	14	Richey, Kan.	20½
Columbus, Kan.	13	Throck, Kan.	22
Quaker Spur, Kan.	13	Bristol, Kan.	22
Military, Kan.	13	Burlington, Kan.	22
Koch, Kan.	17½	Strawn, Kan.	22½
Bangor, Kan.	17½	Hartford, Kan.	22½
Beagle, Kan.	17½	Blue, Kan.	22½
Parker, Kan.	17½	Wychoff, Kan.	22½
Goodrich, Kan.	17½	Emporia Jct., Kan.	22½
Findlay, Kan.	17½	**Emporia, Kan.**	**22½**
Centerville, Kan.	17½	Normal, Kan.	22½
Oakwood, Kan.	17½	Wayman, Kan.	22½
Vance, Kan.	17½	Americus, Kan.	22½
Selma, Kan.	17½	Dunlap, Kan.	22½
Mildred, Kan.	17½	Haucke, Kan.	22½
Bayard, Kan.	17½	Downing, Kan.	22½
Moran, Kan.	17½	Sylvan Park, Kan.	22½
Grace, Kan.	17½	Parkerville, Kan.	22½
Elsmore, Kan.	17½	White City, Kan.	22½
Savonburg, Kan.	17½	Skiddy, Kan.	25½
Stark, Kan.	17½	Olson, Kan.	25½
Kimball, Kan.	17½	Wreford, Kan.	25½
Erie, Kan.	17½	Junct. City, Kan.	25½
Hertha, Kan.	17½	Labette, Kan.	15½
Dudley, Kan.	17½	Oswego, Kan.	15½
*Hollister, Kan.	17½	Condon, Kan.	17
Ladore, Kan.	17½	Idenbro, Kan.	17½
Galesburg, Kan.	17½	Wilston, Kan.	17½
Urbana, Kan.	17½	Mound Valley, Kan.	17½
Petrolia, Kan.	17½	Penfield, Kan.	17½
Nard, Kan.	17½	Angola, Kan.	17½
Humboldt, Kan.	17½	O'Herin, Kan.	17½
Lorton, Kan.	17½		
Neosho Falls, Kan.	17½		

8018—(1) **Gypsum rock**, from points in Oklahoma to **Phoenixville, Ala. To establish a rate** of 24 cents per 100 lb. on gypsum rock and crushed and ground gypsum rock, carloads, minimum weight 60,000 lb., from Darrow, Gladys, Ideal and Southard, **Okla., to Phoenixville, Ala.** The proposed rates, it is stated, are the same as applicable to Birmingham, Ala., and points grouped therewith.

Trunk Line Association Docket

13206 (shippers and receivers). **To establish** rate of $2.39 per ton of 2240 lb. on **fluxing limestone**, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, from Martinsburg, W. Va., to Buffalo, N. Y. Reason: Proposed rate is now applicable on the above commodity from Martinsburg, W. Va., to Erie, Penn., and is also published on furnace limestone, from Martinsburg, W. Va., to Columbus, Ohio. File 36505.

New England Freight Association Docket

9945. **Limestone, crude**, crushed or ground, minimum weight 40,000 lb., from Brandon and Middlebury, Vt., to **Baltimore**, Md., Camden, Elizabeth, Newark, Trenton, N. J., Harrisburg, Lansdown, Lancaster, Philadelphia, Reading, York, Penn., and Wilmington, Del., 25 cents. Reason: Comparable with rate on lime and limestone published in the opposite direction from York, Penn., to N.E. destinations.

Agricultural Lime Rates

EXAMINER CHARLES W. BERRY has recommended the dismissal of No. 17313, Frank T. Case and Sons et al. vs. Pennsylvania, on a finding that the rates on agricultural lime from Buffalo, N. Y., to Troy and Canton, Penn., are not unreasonable or otherwise unlawful. A rate of $3.20 per ton was applied. The record, the examiner said showed that the commodity shipped was agricultural lime and that the testimony was confined to that article while the complainant attacked the rate on agricultural limestone, as if the two articles were identical. The defendant contended that the variance was fatal and that the complainant's evidence had to be disregarded. The examiner said the record contained no testimony distinguishing the various commodities and that no lime expert testified. The complaint alleged the rate was unreasonable, unjustly discriminatory and unduly prejudicial to the extent that it exceeded $1.70 per ton.—*Traffic World.*

Rate Scale Recommended for Sand from Iowa to Illinois Points

A FINDING of unreasonableness, an award of reparation and an order for the future have been proposed by Examiner Arthur Kettler in No. 17110, George Adam Schneider vs. Chicago, Burlington and Quincy et al., as to rates on sand and gravel from Koss Spur, Iowa, to points in Illinois. The complaint alleged the rates from Koss Spur, located on the Milwaukee, to Bolton and other points on the Chicago Great Western in Illinois west thereof, to Eleroy and other points on the Illinois Central in Illinois west thereof, and to Galena, on the Burlington, were unreasonably and unduly prejudicial. The fourth section was also alleged to have been violated, but the examiner said that that allegation was withdrawn. The examiner said the commission should find the rates, since May 14, 1925, were and for the future will be unreasonable and unduly prejudicial to the extent they exceed rates based upon a scale of 90 cents per ton for distances for 30 miles but not in excess of 40; 100 cents for distances 40 to 60 miles; 110 cents for distances 60 to 80 miles, and 120 cents for distances 80 to 85 miles. He said the commission should award reparation to the seller of sand on the authority of Louisville and Nashville vs. Sloss-Sheffield, decided November 23, 1925, by the Supreme Court of the United States.—*Traffic World.*

Lower Rate Asked on Material for Municipal Use in Arkansas

THE Arkansas Highway Commission recently filed with the Arkansas Railroad Commission a petition asking that all railroads in the state be required to allow a rate on rock, sand, gravel and other road building materials consigned to federal, state, county, township or municipal authorities 10 cents a ton below the existing commercial rates on these materials.

The commission set the case for an early hearing. An agreement between the highway commission and railroads of the state has been in effect for the past two years whereby a reduced rate was allowed on material upon which governmental agencies paid freight charges, but that agreement expired January 7.—*Little Rock (Ark.) Gazette.*

Alabama Gravel Rate Approved

THE Alabama Public Service Commission has recently approved application by the Louisville and Nashville railroad of revised rates on sand and gravel, carloads, from Coosada, Ota Oktamulke, Prattville Junction, Jackson's Lake and Montgomery to Elmore. The new rate from the first three points mentioned to Elmore is 45 cents per ton, from Jackson's Lake 50 cents and from Montgomery 54 cents.—*Mobile (Ala.) Register.*

Kosmosdale Cement Rates

EXAMINER ROBERT N. TREZISE, of the Interestate Commerce Commission, in No. 16741, Kosmos Portland Cement Co. vs. Illinois Central et al., said the commission should find rates on cement, carloads, from Kosmosdale, Ky., to destinations on defendants' lines in Illinois, Indiana, Ohio, Michigan, Pennsylvania and West Virginia unduly prejudicial to the advantage of Marquette, Prospect Hill, Continental and Hannibal, Mo., to the extent they exceed the scales of rates maintained from the points mentioned to destination in the states mentioned. His conclusion was as follows:

The commission should find that the record does not justify different findings from those announced in the Atlas case, 81 I.C.C. 1 and in Cape Girardeau Portland Cement Co. vs. B. & O. R. R. Co., 95 I.C.C. 632, insofar as they relate to undue prejudice. It should further find that the rates assailed from Kosmosdale to destinations in the states named are unduly prejudicial to complainant to the advantage of cement producers at Marquette, Prospect Hill, Continental and Hannibal, Mo., to the extent that they exceed the scales of rates contemporaneously maintained from the latter points to destinations in the states named. An appropriate order should be entered. — *Traffic World.*

Crushed Stone Rate Adjustment

RECOMMENDATION of the rates to be applied under findings in an earlier report have been made by Examiner F. L. Sharp, in No. 14472, Dolese Bros. Co. et al. vs. Atchison, Topeka and Santa Fe Railway et al., as to rates on crushed stone from Buffalo and Linwood, Iowa, to destinations in northern Illinois. The original report was made in 89 Interstate Commerce Commission 110. He recommends rates of 88 cents, $1.01, $1.13, $1.26, and $1.39 to five groups. That is, his recommendation has the effect of creating five groups.

Cement Rate Refund Asked

COMPLAINTS have recently been filed by three cement companies with the Kansas Public Service Commission to test whether or not there is any way these companies can collect refunds from the railroads for freight paid based on rates subsequently declared unreasonable by the commission.

The third complaint was filed by Reed & Glover for the Great Western Portland Cement Co. against the Missouri Pacific and M. K., & T. railroads. It alleges that prior to May 25, 1924, the rate from Iola to Mildred was 9 cents a hundred plus $2.25 a car. The rate has been held unreasonable, and now the railroads are collecting only the 9 cents a hundred. The company asks a refund order for three years back of the time when the rate was held unreasonable. Similar complaints have been filed by the Lehigh Portland Cement Co. and the Atlas Portland Cement Co.—*Topeka (Kan.) Capital.*

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.65	1.65	1.40	1.40	1.40
Cobleskill, N. Y.	1.50	1.35	1.25	1.25	1.25	
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Eastern Pennsylvania	1.35	1.35	1.35	1.35	1.35	1.35
Frederick, Md.	.50	.75	1.30	1.20	1.10	1.10
Munns, N. Y.	1.00	1.25	1.40	1.30	1.25	
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@1.60	1.40@1.60	
Prospect, N. Y.	1.00	1.50	1.40	1.30	1.30	
Walford, Penn.	.70	1.35	1.35	1.35	1.35	1.50
Watertown, N. Y.	.50		1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Afton, Mich.			.50			1.50
Alton, Ill.	1.85		1.85			
Bloomville, Middlepoint, Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo and Linwood, Iowa	1.10		1.20	1.00	1.25	1.25
Chasco, Ill.	1.25					1.15
Columbia, Krause, Valmeyer, Ill.	1.00@1.50	1.20@1.25	1.20@1.25	1.20	1.20	1.50
			Flux 1.50@1.75			
Cypress, Ill.	1.15	1.15	1.15	1.15	1.05	1.00
Greencastle, Ind.	1.30	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Milltown, Ind.		.90@1.00	.75@ .85	.90@1.00	.85@ .90	.85
Northern New Jersey	1.30		1.80	1.60	1.40	
River Rouge, Mich.	1.10	1.10	1.10	1.10	1.10	1.10
St. Vincent de Paul, Que.	.75	1.25	1.05	.95	.90	.90
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Stone City, Iowa	.75		1.15†	1.05	1.00	
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
SOUTHERN:						
Allgood, Ala.			Crusher run, fines out, for flux, 1.00 per net ton			
Cartersville, Ga.		1.65	1.65	1.25	1.15	
Chico, Tex.	1.00	1.40	1.35	1.25	1.15	1.10
El Paso, Tex.	1.00	1.00	1.00	1.00		
Ft. Springs, W. Va.	.50	1.60	1.50	1.35	1.25	
Graystone, Ala.			Crusher run fluxing stone, 1.00 per net ton			
Henderson, N. C.			1.50		1.25	
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
New Braunfels, Tex.	.30@1.00	1.00@1.30	1.00@1.30	.70@1.00	.70@ .90	
Olive Hill, Ky.	.50@1.00‡	1.00	1.00	1.00	1.00	1.00
Rocky Point, Va.	.50@1.00	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atkinson, Kans.	.25	2.00	2.00	2.00	2.00	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25		1.25	1.25	1.10	
Kansas City, Mo.	.75	1.50	1.50	1.50	1.50	1.50
Limestone, Wash.	3.00	3.00	3.00	3.00	3.00	3.00
Rock Hill, St. Louis county, Mo.	1.20	1.35	1.35	1.35	1.35	1.35

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.70	1.45	1.20	1.05	
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.00	1.00	1.00	.90	.90	
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	2.50	2.00	1.55	1.40	1.25	1.25
New Haven, New Britain, Meriden & Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.50	2.00	1.80	1.40	1.40	
Oakland and El Cerritto, Cal.	1.00	1.00	1.00	.90	.90	
San Diego, Calif.		2.75	2.55	2.35	2.35	
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	
Springfield, N. J.	1.60	2.00	2.00	1.60	1.60	
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Columbia, S. C.—Granite			1.75		1.50	
Eastern Penn.—Quartzite	1.20	1 35	1.25	1.20	1.20	1.20
Havelock, Ontario		2.60	2.10	2.10		
Lithonia, Ga.—Granite	.75	1.75	1.60	1.40	1.35	1.35
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	
Middlebrook, Mo.—Granite	3.00@3.50		2.00@2.25	2.00@2.25		1.25@2.00
Northern New Jersey (Basalt)	1.50	2.00	1.80	1.40	1.40	
Richmond, Calif.—Quartzite	.75		1.00	1.00	1.00	
Somerset, Pa. (sand-rock)	1.85@2.00a		1.35@1.50		1.00@1.50	
Toccoa, Ga.—Granite			1.60	1.45	1.40	

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ¼ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Dust. (f) ¼ in. (h) less 10c discount. (i) 1 in., 1.40.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh	6.00
Asheville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Atlas, Ky.—90% thru 100 mesh	2.00
50% thru 100 mesh	1.00
Belfast and Rockland, Me. (rail), Lincolnville, Me. (water), analysis $CaCO_3$ 90.04%; $MgCO_3$ 1.5%, 100% thru 14 mesh, bags	4.50
Bulk	3.50
Branchton and Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; pulverized; 50% thru 50 mesh	1.50
Cartersville, Ga.—Analysis 68% $CaCO_3$, 32% $MgCO_3$; pulverized	2.50
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Chico, Texas.—50% thru 50 mesh, bulk	1.75
Colton, Calif.—Analysis 90% $CaCO_3$, bulk	4.00
Cypress, Ill.—90% thru 100 mesh	1.35
Danbury, Conn., Rockdale and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 5% $MgCO_3$; 50% thru 100 mesh; paper bags, 4.25; cloth, 4.75; bulk	3.25
Henderson, N. C. (paving dust)—80% thru 200 mesh, bags	4.25@ 4.75
Bulk	3.00@ 3.50
Analysis $CaCO_3$, 56%; $MgCO_3$, 42%; 65% thru 200 mesh, bags	3.95
Bulk	2.70
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$, 37% $MgCO_3$; 80% thru 100 mesh; bags, 3.95; bulk	2.70
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk	3.50
Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton	2.00
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh	3.90@ 4.50
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35@ 1.60
Olive Hill, Ky.—50% thru 50 mesh, 2.00; 90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis 99.5% $CaCO_3$, 0.25% $MgCO_3$; 50% thru 200 mesh; bags, 3.25@3.50; bulk	2.00
Toledo, Ohio, 30% through 50 mesh	2.25
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh	2.10
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh	3.00
Atlas, Ky.—50% thru 4 mesh	.50
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh	1.50
Blackwater, Mo.—Analysis, 99% $CaCO_3$; 90% thru 4 mesh	.75
Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.75
50% thru 4 mesh	1.50
Chasco, Ill.—50% thru 100 mesh	1.20
Chico, Texas—50% thru 4 mesh; bulk	1.50

(Continued on next page)

Agricultural Limestone

Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh	.80
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh	1.35
Cypress, Ill.—90% thru 50 mesh, 50% thru 100 mesh, 90% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	1.35
Dundas, Ont.—Analysis, 53.8% $CaCO_3$; $MgCO_3$, 43.3%. 50% thru 50 mesh; bags, $4.75; bulk	3.00
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Garnet, Okla.—All sizes	1.25
McCook, Ill.—Analysis, approx. 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh	.90
Kansas City, Mo.—50% thru 100 mesh	.75
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk	1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@ 2.35
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 25 to 45% thru 100 mesh	1.60
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Pixley, Mo.—Analysis, 96% $CaCO_3$; 50% thru 50 mesh	1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh	1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes	1.25

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00
Piqua, Ohio, sacks, 4.50@5.00 bulk	3.00@ 3.50
Rocky Point, Va.—80% thru 200 mesh; bags, 4.25@4.75; bulk	3.00@ 3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Berkeley Springs, W. Va.—Glass sand	2.25
Cedarville and S. Vineland, N. J.—Damp	1.75
Dry	2.25
Cheshire, Mass.: 6.00 to 7.00 per ton; bbl	2.50
Columbus, Ohio	1.25@ 1.50
Estill Springs and Sewanee, Tenn.	1.50
Franklin, Penn.	2.25
Gray Summit and Klondike, Mo.	2.00
Los Angeles, Calif.—Washed	5.00
Mapleton Depot, Penn.	2.00@ 2.25
Massillon, Ohio	3.00
Mineral Ridge and Ohlton, Ohio	2.50
Oceanside, Calif.	3.00
Ottawa, Ill. (Contracts)	1.00
Pittsburgh, Penn.—Dry	4.00
Damp	3.00
Red Wing, Minn.: Bank run	1.50
Ridgway, Penn.	2.50
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.25
San Francisco, Calif.	4.00@ 5.00
St. Louis, Mo.	2.00
Sewanee, Tenn.	1.50
Thayers, Penn.	2.50
Utica, Ill.	1.00
Zanesville, Ohio	2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.75
Eau Claire, Wis.		.45@ 1.25
Estill Springs and Sewanee, Tenn.	1.35@ 1.50	1.35@ 1.50

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Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Boston, Mass.‡	1.40	1.40	2.25		2.25	2.25
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		1.00*		1.50*	1.75*	
Farmingdale, N. J.		.48	.75		1.10	
Hartford, Conn.	.65*					
Leeds Junction, Me.		.50	1.75		1.35	1.25
Machias Jct., N. Y.		.75	.75		.75	
Montoursville, Penn.	1.35	1.10	1.00	.75	.75	.75
Northern N. J.		.45@ .70	.45@ .70	1.45	1.45	.145
Olean, N. Y.		.75	.75	.75	.75	.75
Shining Point, Penn.			1.00	1.00	1.00	1.00
Somerset, Pa.		1.85@2.00		1.35@1.50		
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Attica, Ind.			All sizes .75@.85			
Barton, Wis. (f)		.50		.75	.75	.75
Chicago, Ill.	.70	.50	.50	.60	.60	.60
Columbus, Ohio		.65@ .70	.65@ .70	.65@ .70	.65@ .70	.65@ .70
Des Moines, Iowa	.40	.40	1.50	1.50	1.50	1.50
Eau Claire, Wis.	.45	.45	.80	.90	.90	.90
Elgin, Ill.		.20*	.50*	1.50*	1.50*	1.50*
Elkhart Lake, Wis.	.50	.50	.60	.60	.60	.50
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Haven, Mich.		.40@ .80		.60@1.00		
Grand Rapids, Mich.		.50		.80	.80	.70
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.		.50		.70		.60
Humboldt, Iowa	.40@ .60	.40@ .60	1.40@1.60	1.40@1.60	1.40@1.60	1.40@1.60
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Joliet, Plainfield and Hammond, Ill.	.60	.50	.50	.60	.60	.60
Mason City, Iowa	.50	.50	1.45	1.45	1.45	1.35
Mankato, Minn.	.55	.45		1.25	1.25	
Mattoon, Ill.	.75	.75	.75	.75	.75	.75
Milwaukee, Wis.		1.01	1.21	1.21	1.21	1.21
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.70	.70			1.60	
Oregon City, Ore.		1.25	1.25	1.25	1.25	1.25
Palestine, Ill.	.75	.75	.75	.75	.75	.75
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.18	1.45	1.65	1.45	1.65	1.45e
Terre Haute, Ind.	.75	.75	.75	.75	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.25	1.25	1.10	1.10
Yorkville, Sheridan, Oregon, Moronts, Ill.		.40@ .70	.30@ .50	.50@ .60	.60	.60
Zanesville, Ohio		.70	.50		.80	
SOUTHERN:						
Charleston, W. Va.			All sand, 1.40.	All gravel, 1.50.		
Chattanooga, Tenn.		1.65			1.45	
Knoxville, Tenn.	1.00	1.20	1.20	1.20	1.20	1.20
Lindsay, Texas					.55	
Macon, Ga.	.50	.50	1.00	1.00	1.00	1.00
New Martinsville, W. Va.	1.00	.90@1.00		1.20@1.30		.80@ .90
Roseland, La.	.50			1.00	1.00	
WESTERN:						
Kansas City, Mo.	.80	.70				
Los Angeles, Calif. (points all around) (d)	.60	.50	.85	.85	.85	.85
Los Angeles district (bunkers)†	1.50	1.40	1.85	1.85	1.85	1.85
Pueblo, Colo.	.80	.65		1.35		1.20
San Diego, Calif.	.65@ .75	.65@ .75	1.50	1.30	1.10	1.10
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Chicago, Ill.	.95					
Dudley, Ky.	1.10	1.00	.90			
East Hartford, Conn.			Sand, 65*			
Ferrysburg, Mich.						.65@1.00
Gainesville, Texas		.95				.55
Grand Rapids, Mich.				.60		
Hamilton, Ohio					.70	
Hersey, Mich.				.55		
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Joliet, Plainfield and Hammond, Ill.	.35					
Lindsay, Texas		.95				.55
Macon, Ga.	.35	.35				
Mankato, Minn.			Pit run sand, .50			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Ottawa, Oregon, Moronts and Yorkville, Ill.			Ave. .60 per ton all sizes			
Roseland, La.	.60					
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	.54
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Waukesha, Wis.	.60	.60	.60	.60	.60	.64
Winona, Minn.	.40	.40	.50	60	60	.60
York, Penn.	1.10	1.00				

(a) ¾ in. down. (b) River run. (c) 2½ in. and less.
*Cubic yd. †Include freight and bunkerage charges and truck haul. ‡Delivered on job.
(d) Less 10c per ton if paid E.O.M. 10 days. (e) pit run. (f) plus 15c winter loading charge.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Aetna, Ill.				.30@ .35			
Albany, N. Y.	2.25	2.00	2.25	1.50		3.50	
Arenzville, Ill.	1.50@1.75			1.00			
Beach City, Ohio	1.75@2.00	1.75@2.00		1.75	2.00@2.50	2.00	1.75@2.00
Columbus, Ohio	2.00@2.50	1.50@2.50	2.00@3.00	.20@ .30	2.50	3.50@4.50	1.50@2.00
Eau Claire, Wis.				1.25		3.00	
Elco, Ill.	Ground silica per ton in carloads—18.00@31.00						
Elnora, N. Y.			1.75				
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Penn.	1.75	1.75	2.00	2.00	2.00		
Joliet, Ill.	No. 2 molding sand; loam for luting and open hearth work—.65@.85						
Kasota, Minn.							1.00@1.25
Klondike, Mo.	1.75		2.00	1.75	1.75		1.25
Mapleton Depot, Penn.	2.00	2.00				2.00	
Massillon, Ohio	2.50	2.50		2.50	2.50		
Michigan City, Ind.				.15@ .30			
Mineral Ridge and Ohlton, Ohio	2.00*	1.75*		2.00*	1.75*	1.75*	
Montoursville, P'n.				1.25@1.35			
New Lexington, O.	2.00	1.50					
Ottawa, Ill.		.75@1.00†					
Red Wing, Minn.	1.25		1.25	1.50	1.50	3.50	1.50
Ridgeway, Penn.	1.50	1.50					
Round Top, Md.	1.25			1.60		2.25	
San Francisco, Calif.	3.50	4.75	3.50	3.50@5.00	3.50@4.50	3.50@5.00	
Tamalco, Ill.		1.50@1.75					
Tamms, Ill.	Ground silica per ton in carloads—20.00@31.00						
Thayers, Penn.	1.25	1.25		2.00			
Utica, Ill.	.65	.75		.75	.75		
Utica, Penn.	1.75	1.75		2.00			
Warwick, Ohio	1.75*@2.25	1.75*		1.75*@2.25			
Zanesville, Ohio	2.00	1.50	2.00	2.00	2.00		

*Damp. †Crude silica, crushed and screened, not washed or dried. ‡Plus 75c per ton for winter loading.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Emporium nd Dubois, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Pa.	2.50	1.00		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*			1.45*
Jackson, Ohio		1.05*		1.30*	1.30*	1.30*	1.30*
Toledo, Ohio	1.50	1.25	1.50	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.55*		1.55*	1.55*	1.55*	1.55*
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruessens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
Woodward, Ala.		.75		1.25	.90	.90	.75

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.20
Buffalo, N. Y.		12.00	12.00	12.00			10.00	1.95d
Chazy, N. Y.	12.50	10.50	8.00	12.00	11.50	16.50	10.00	2.50$_2$
Lime Ridge, Penn.							5.00a	
West Stockbridge, Mass.	12.00	10.00	5.60					2.00t
Williamsport, Penn.			10.00				6.00	
York, Penn.		9.50	9.50	11.50			8.50	1.65i
CENTRAL:								
Afton, Mich.					8.50	1.61		
Carey, Ohio	12.50	8.50@9.50	9.50		9.50		9.00	
Cold Springs, Ohio	12.50	8.50	8.50		9.00		8.00	
Delaware, Ohio	12.50	10.00	9.00	10.00			9.00	1.50
Frederick, Md.		10.00	9.50	10.00			7.50	1.45
Gibsonburg, Ohio	12.50	8.50	8.50	8.50		9.00	11.00‡	
Huntington, Ind.		8.50	8.50		9.00	11.00	8.00	1.50c
Luckey, Ohio (f)	12.50							
Marblehead, Ohio		8.50	8.50		9.00		8.00	1.50c
Marion, Ohio		8.50						1.70d
Milltown, Ind.		9.00@10.00		10.00p	8.00$_3$			1.40r
Sheboygan, Wis.		11.50					9.50	
Tiffin, Ohio					9.00			
White Rock, Ohio	12.50				9.00	11.00		
Wisconsin points (f)		11.50					9.50	
Woodville, Ohio	12.50	8.00	8.00	12.50	9.00	11.00	9.00	1.50
SOUTHERN:								
Allgood, Ala.	12.50	10.00			8.50		8.50	1.50
El Paso, Tex.							14.00	1.75
Graystone, Ala.	12.50	10.00		12.50			8.50	1.50
Keystone, Ala.	12.00	10.00	10.50	10.00	9.00		8.50	1.50u
Knoxville, Tenn.	20.25	10.00		10.00			8.50	1.50
Ocala, Fla.		14.00	10.00		13.00	1.60$_1$		1.70
WESTERN:								
Calcite, Colo.							9.25	
Kirtland, N. M.							15.00	
Limestone, Wash.	15.00	15.00	10.00	15.00	16.50	16.50	16.50	2.09
Dittlinger, Tex.		12.00@13.00					9.50p	1.50$_4$
San Francisco, Calif.	21.00	21.00	12.50@15.00	21.00			14.50	1.90v
Tehachapi, Calif.			8.00				13.00z	2.20x
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

†50-lb. paper bags; (a) run of kilns; (c) wooden, steel 1.70; (d) steel; (e) per 180-lb. barrel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 180-lb. net barrel 1.65; 280-lb. net barrel, 2.65 (m) finishing lime, 3.00 common; (n) common lime; (o) high calcium; (p) to 10.50; (q) to 8.50; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) to 3.00; (u) two 90-lb. bags; (v) oil burnt; wood burnt 2.25@2.50; (x) wood, steel 2.30; (z) to 15.00; (*) quoted f.o.b. New York; (‡) paper bags; (w) to 1.50 in two 90-lb. bags, wood bbl. 1.60; (ff) to 10.00; ($_1$) 80-lb. paper bags; ($_2$) to 3.00; ($_3$) to 9.00; ($_4$) to 1.60.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing sand	Traction
Gray Summit and Klondike, Mo.		1.75
Mapleton, Depot, Penn.		2.00
Massillon, Ohio		2.25
Mineral Ridge and Ohlton, Ohio	*1.75@ 2.00	*1.75
Montoursville, Penn.		1.10
Ottawa, Ill.	1.25@ 1.50	
Red Wing, Minn.		1.25
Round Top, Md.	2.25	1.75
San Francisco, Calif.	3.50@ 4.50	3.50@ 4.50
Thayers, Penn.		2.25
Utica, Ill.	1.00	1.00
Warwick, Ohio		2.25
Zanesville, Ohio		2.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel worker's crayons, per gross	.08 1.25
Chatsworth, Ga.:	
Crude Talc	5.00
Ground (150-200 mesh), bulk	12.00
Pencils and steel worker's crayons, per gross	1.00@ 2.50
Chester, Vt.:	
Ground talc (150-200 mesh), bulk	10.00@11.00
Including bags	11.00@12.00
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	30.00
Dalton, Ga.:	
Crude talc	5.00
Ground talc (150-200) bags	10.00@12.00
Pencils and steel workers' crayons, per gross	1.00@ 1.50
Emeryville, N. Y.:	
(Double air floated) including bags;	
325 mesh	14.75
200 mesh	13.75
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) including bags, 300-350 mesh	15.50@20.00
Henry, Va.:	
Crude (mine run)	3.50@ 4.50
Ground talc (150-200 mesh), bags	9.75@12.50
Joliet, Ill.:	
Ground talc (150-200) bags	30.00
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00
Natural Bridge, N. Y.:	
Ground talc (300 mesh), bags	12.00@14.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 65-70%	4.50@ 5.00
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@ 5.50
Tennessee—F.O.B. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	7.00@ 8.00

Ground Rock

(2000 lbs.)

Centerville, Tenn.—B.P.L. 65%	7.00
Gordonsburg, Tenn.—B.P.L. 65-70%	4.00@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 65%; bulk	7.25
Twomey, Tenn.—B.P.L. 65%	7.25

Florida Phosphate

(Raw Land Pebble)

(Per Ton.)

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	3.00
70% min. B.P.L., Basis 70%	3.25
72% min. B.P.L., Basis 72%	4.25
75/74% B.P.L., Basis 75%	5.00
77/76% B.P.L., Basis 77%	6.00

Mica

Prices given are net, F.O.B. plant or nearest shipping point.

Keene, N. H.—per ton, mine run	150.00 up
Clean shop scrap	30.00
Mine scrap	30.00
20 mesh	40.00
40 mesh	50.00
60 mesh	70.00
100 mesh	75.00
Roofing mica	40.00
Punch mica, per lb.	.20
Pringle, S. D.—Mine run, per ton,	
Punch mica, per lb.	.05@ .07
Scrap, per ton, carloads	19.00@ 20.00

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars		10.50
Brandon, Vt.—English pink and English cream	*11.00	*11.00
Brandon grey	*11.00	*11.00
Buckingham, Que.—Buff stucco dash		‡12.00@14.00
Chicago, Ill. — Stucco chips, in sacks f.o.b. quarries		17.50
Crown Point, N. Y.—Mica Spar		8.00@10.00
Easton, Penn. — Green bags included	18.00@20.00	18.00@20.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Blk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio — Concrete facings and stucco dash		6.00@18.00
Middlebrook, Mo.—Red		20.00@25.00
Middlebury and Brandon, Vt.—Middlebury white		‡9.00
Milwaukee, Wis.		14.00@34.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Calif. — "Natrock" roofing grits		12.00@16.00
Tuckahoe, N. Y.		12.00
Villa Grove, Colo.		13.00
Warren, N. H.—cement facing (mica), per ton		7.50
Wauwatosa, Wis.		16.00@45.00
Wellsville, Colo.—Colorado Travertine Stone ‡C.L.	15.00	15.00

*C.L. including bags; L.C.L. 12.50.
‡C.L. including bags, L.C.L. 10.00.

Potash Feldspar

Auburn and Brunswick, Me.—Color, white; 98% thru 140 mesh bulk	19.00
Bath, Me.—Color, white; analysis, potash, 12%; 100% thru 180 mesh, bags, 21.00; bulk	18.00
Buckingham, Que.—Color, white; analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white; bulk (crude)	9.00
East Hartford, Conn.—Color, white, 95% thru 80 mesh	18.00
Finer grades	20.00@23.00
Erwin, Tenn.—Color, white; analysis, 12.07% K_2O, 19.34% Al_2O_3; Na_2O, 2.92%; SiO_2, 64.76%; Fe_2O_3, .36%; 98.50% thru 200 mesh, bags, 16.90; bulk	15.50
Glen Tay Station, Ont., color, red or punk; analysis: K_2O, 12.81%, crude, bulk	6.00@ 7.50
Los Angeles, Calif.—Color, white; analysis, K_2O, 10.35%; Na_2O, 3.62%; Al_2O_3, 18.71%; SiO_2, 65.48%; Fe_2O_3, .17%; 100% thru 150 mesh, bags included, C.L.	22.00
Bulk	20.00
Murphysboro, Ill.—Color, snow white; analysis SiO_2, 64.4%; K_2O, 13%; Na_2O, 2.5%; Fe_2O_3, 0.07%; Al_2O_3, 19.3%; 98% thru 200 mesh, bags	21.00
Bulk	21.00
Penland, N. C.—Color, white; crude, bulk	8.00
Ground, bulk	16.50
Tenn. Mills—Color, white; analysis K_2O, 18%; Na_2O_3, 10%; 68% SiO_2; 99% thru 200 mesh; bulk	18.00
99% thru 140 mesh, bulk	16.00
Toughkenamon, Pa.—Color, white to light cream; 98% thru 150 mesh, bags, 11.00@13.00; bulk	10.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00
Trenton, N. J.—Crude, bulk	12.00@27.00
99% thru 140 mesh; bulk	16.00
(Bags 11 cents each, non-returnable)	
Wheeling, W. Va.—Color, white; analysis, K_2O, 9.50%; Al_2O_3, 16.70%; Na_2O, 3.50%; SiO_2, 69.50%; 99% thru 140 mesh, bulk	19.00

Blended Feldspar
(Pulverized)

Tenn. Mills—Bulk 16.00@20.00

Chicken Grits

Afton Mich. (limestone) per ton	10.00
Belfast and Rockland, Me.—(Limestone), bags, per ton	‡10.00
Brandon and Middlebury, Vt., per ton	12.00‡
Centerville, Iowa (gypsum) per ton	18.00
Chico, Texas (limestone), 100 lb. bags, per ton	9.00@11.00
Los Angeles Harbor (limestone), 100-lb. sack, 1.00; sacks, per ton, 8.50@9.50†; bulk, per ton	6.00@7.00†
Toughkenamon, Pa.—(Feldspar) 100-lb. bags, 1.00; bulk, per ton	10.00
Danbury, Conn., Rockdale and West Stockbridge, Mass. — (Limestone) bulk	7.50@9.00*
Gypsum, Ohio.—(Gypsum) per ton	10.00
Limestone, Wash. (limestone) per ton	12.50
Rocky Point, Va. (limestone) 100 lb. bags, 75c; sacks, per ton, 6.00 bulk	5.00
Seattle, Wash.—(Limestone), bulk, per ton	12.50
Warren, N. H.—(Mica) per ton	7.80
Waukesha, Wis.—(Limestone), per ton	7.00

*L.C.L.
†Less than 5-ton lots.
‡C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass	14.50
Brighton, N. Y.	*19.75
Dayton, Ohio	12.50@13.50
Detroit, Mich.	‡13.00@14.85
Farmington, Conn.	16.00
Flint, Mich.	¶12.50@16.00
Grand Rapids, Mich.	12.00
Hartford, Conn.	*19.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.00
Madison, Wis.	†a14.00
Michigan City, Ind.	12.00
Milwaukee, Wis.	*13.00
Minneapolis and St. Paul, Minn.	11.25
New Brighton, Minn.	10.00
Pontiac, Mich.	12.50@13.50
Portage, Wis.	15.00
Rochester, N. Y. (del. on job)	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	12.00@12.50
Sebewaing, Mich.	12.00
Syracuse, N. Y.	20.00
Terra Cotta, D. C.	13.50
Toronto, Canada	12.00
Wilkinson, Fla.-White	12.00
Buff	16.00

*Delivered on job. †Delivered in city limits. ‡Less 5%. ¶Dealers' price. (a) Less 1.00 E.O. M. 10 days.

Portland Cement

Prices per bag and per bbl, without bags net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.		3.47
Atlanta, Ga.		2.35
Baltimore, Md.		1.70@2.35
Birmingham, Ala.		2.30
Boston, Mass.		1.81@2.63
Buffalo, N. Y.		1.67@2.38
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa		2.34
Charleston, S. C.		2.35
Cheyenne, Wyo.	.82¾	3.31
Cincinnati, Ohio		2.37
Cleveland, Ohio		2.29
Chicago, Ill.		21.0@2.60
Columbus, Ohio		2.34
Dallas, Texas		2.10
Davenport, Iowa		2.29
Dayton, Ohio		2.38
Denver, Colo.	.66¼	2.65
Detroit, Mich.		2.15
Duluth, Minn.		2.09
Houston, Texas		2.60
Indianapolis, Ind.		2.29
Jackson, Miss.		2.60
Jacksonville, Fla.		2.35
Jersey City, N. J.		1.85@2.33
Kansas City, Mo.		2.02@2.42
Los Angeles, Calif.	.61†	
Louisville, Ky.		2.27
Memphis, Tenn.		2.80@3.00
Milwaukee, Wis.		2.25
Minneapolis, Minn.		2.32@2.72
Montreal, Que.		1.90
New Orleans, La.		2.20
New York, N. Y.		1.77@2.25
Norfolk, Va.		2.17
Oklahoma City, Okla.		2.86
Omaha, Neb.		2.76
Peoria, Ill.		2.27
Philadelphia, Penn.		1.85@2.41
Phoenix, Ariz.		3.70
Pittsburgh, Penn.		2.09
Portland, Colo.	.72½	2.90
Portland, Ore.		3.20
Reno, Nevada	.75¼	3.01
Richmond, Va.		1.69@2.44
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.		2.31
Savannah, Ga.		2.50
St. Louis, Mo.	.55	2.20
St. Paul, Minn.		2.32
Seattle, Wash.	10c discount	2.65
Tampa, Fla.		2.60
Toledo, Ohio		2.20
Topeka, Kans.		2.65
Tulsa, Okla.		2.73
Wheeling, W. Va.		2.17
Winston-Salem, N. C.		2.78

NOTE—Add 40c per bbl. for bags.
†Delivered on job in any quantity, sacks extra.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.		1.85
Chattanooga, Tenn.		2.45*
Concrete, Wash.		2.35
Davenport, Calif.		2.05
Detroit, Mich.		2.15
Hannibal, Mo.		2.05
Hudson, N. Y.		2.05
Leeds, Ala.		1.95
Mildred, Kans.		2.35
Nazareth, Penn.		1.95
Northampton, Penn.		1.95
Richard City, Tenn.		2.05
Steelton, Minn.		1.90
Toledo, Ohio		2.20
Universal, Penn.		1.85

*Including sacks at 10c each.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x 36". Wt. 1500 lb. Per M Sq. Ft.	½x32x 36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ½x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Arden, Nev. and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	.....	.....	.....	.....	11.70u	.....	.....	.....
Centerville, Iowa	2.75	12.00	.....	.....	10.00	10.00	12.00	.....	.....	13.00	.....	.....	.....
Detroit, Mich.‡	.....	.....	.....	11.30	11.30	11.30	.....	.....	.....	.....	.....	.....	.....
Delawanna, N. J.	.....	.....	.....	.....	.....	8.00	.....	8.25@9.40	.....	.....	.14½s	.15½s	40.00@41.00
Douglas, Ariz.	.....	.....	7.00	.....	.....	15.50d	18.50	.....	30.00	15.50	.....	.....	.....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	.....	24.55	20.00	.....	.....	.....
Gypsum, Ohio‡	3.00	4.00	6.00	7.00	9.00	9.00	19.00	7.00	27.00	19.00	.....	15.00	30.00
Hanover, Mont.	.....	.....	.....	11.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Los Angeles, Calif.	.....	.....	.....	10.30k	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	13.40r	14.40r	.....	15.40r	.....	.....	.....	.....	.....	.....
Seattle, Wash.	6.50	.....	11.00	16.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sigurd, Utah	.....	.....	.....	.....	.....	.....	.....	.....	18.00a	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 25.00; (b) net; (c) gross; (d) hair fibre; (f) delivered; (h) delivered in six states; (i) delivered on job; (k) sacks 12c extra, rebated; (m) includes paper bags; (o) includes jute sacks; (r) including sacks at 15c; (s) per board; (t) to 16.50; (u) includes sacks; (v) F.O.B. N. Y. C. and dealers yard in mill locality.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City of shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00		
Columbus, Ohio	.16@.18a		
Detroit, Mich.	19.00‡		28.00‡
Forest Park, Ill.	18.00*	23.00*	30.00*
Grand Rapids, Mich.	.16		
Graettinger, Iowa	.18@.20		
Indianapolis, Ind.	.14@.16†		
Los Angeles, Calif.¶	6x3½x12—50.00; 8x3½x12—60.00		
Oak Park, Ill.	.18@.21a		
Olivia and Mankato, Minn.	9.50b		
Somerset, Pa.	.20@.22		
Yakima, Wash.	20.00*		

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton.

Cement Roofing Tile

Prices are net per sq. in carload lots, f.o.b. nearest shipping point unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.

Red	15.00
Green	18.00
Chicago, Ill.—per sq.	20.00

Cicero, Ill.—Hawthorne roofing tile, per sq.

	Chocolate Red and Orange	Yellow, Tan Green and Blue	Slate Gray
French and Spanish†	$11.50	$13.50	$12.75
Ridges (each)	.25	.35	.30
Hips	.25	.35	.30
Hip starters	.50	.60	.60
Hip terminals, 2-way	1.25	1.50	1.50
Hip terminals, 4-way	4.25	5.00	5.00
Mansard terminals	2.50	3.00	3.00
Gable finials	1.25	1.50	1.50
Gable starters	.25	.35	.30
Gable finishers	.25	.35	.30
*End bands	.25	.35	.30
*Eave closers	.06	.08	.06
*Ridge closers	.05	.06	.05

*Used only with Spanish tile.
†Price per square.

Houston, Texas.—Roofing Tile, per sq.

Red	17.00
Green	19.50
Indianapolis, Ind.—9"x15"	
Gray	10.00
Red	11.00
Green	13.00
Waco, Texas:	Per sq.
4x4	.60
4x8x12	65.00
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Grand Rapids, Mich.:	Per 1000
5x8x12	70.00
Houston, Texas:	
5x4x12 (Lightweight)	45.00
5x8x12 (Lightweight)	80.00
Pasadena, Calif.—(Stone Tile	Per 100
3½x4x12	3.00
3½x6x12	5.00
3½x8x12	6.00

Wildasin Spur, (Building Tile) Los Angeles, Calif.:

	Each
4x3½x12	.03½
6x3½12	.04½
8x3½x12	.05½

Yakima, Wash.—Building tile:

5x8x12	.10

Cement Building Tile

Cement City, Mich. — 5"x8"x12", per M	55.00
Detroit, Mich.—5x8x12, per 100	8.50
Longview, Wash.—(Stone Tile)	Per 1000
4x6x12	55.00

Cement Drain Tile

Graettinger, Iowa drain tile per 100 ft.

5-in	4.50
6-in	5.60
8-in.	9.00
10-in.	12.00
12-in.	17.50
14-in.	25.00
16-in.	35.00
18-in.	45.00
20-in.	60.00
22-in.	70.00
24-in.	80.00
30-in.	100.00
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00

Tacoma, Wash.—Drain tile per ft.:

3 in.	.04
4 in.	.05
6 in.	.07½
8 in.	.10

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@35.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Longview, Wash.	20.00	
Milwaukee, Wis.	15.00	33.00@42.00
Mt. Pleasant, N. Y.		14.00@23.00
Omaha, Neb.	18.00	30.00@40.00
Pasadena, Calif.	12.50	
Philadelphia, Penn.	†15.25	‡21.50
Portland, Ore.	17.00	25.00@75.00
Prairie du Chien, Wis.	14.00	22.50
Rapid City, S. D.	18.00	25.00@40.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Wauwatosa, Wis.	14.00	20.00@42.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	

†Gray. ‡Red.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								$14.00 per ton									
Graettinger, Iowa	.04½d	.05½	.08½	.13	.17½	.....	.50	.60	.75	.85	.....	.....	.....	.....	.....	.....	.....
G'd Rapids, Mich. (b)	.....	.....	.....	.60	.72	1.00	1.28	.....	.....	1.92	2.32	3.00	4.00	5.00	6.00	.....	.....
Houston, Texas	.....	.19	.24	.43	.55½	.90	1.30	.....	†1.70	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.80	.90	1.10	1.30	.....	.....	1.70	.....	2.70	.....	.....	.....	.....	.....
Longview, Wash.								Sewer pipe 40% off list, culvert—list									
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Olivia & Mankato, Minn.												12.00 per ton					
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Pa.	.....	.....	.....	.....	80[1]	1.00[2]	1.40[3]	.....	.....	2.00[4]	.....	3.25[5]	4.00[6]	6.00[7]	.....	.....	.....
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tiskilwa, Ill. (rein.) (a)	.....	.....	.....	.65	.75	.85	1.10	1.60	.....	1.90	.....	.....	3.40	.....	.....	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78
Waukesha, Wis.								12 in. to 60 in. 18.00 per ton									
Yakima, Wash.								$10.00 per ton									

*30-in. lengths up to 27-in. diam., 48-in. lengths after; (a) 24-in. lengths; (b) Reinforced; (c) Interlocking bar reinforced.
†21-in. diam. ‡Price per 2 ft. length. (d) 5 in. diam. [1]@1.08. [2]@1.25. [3]@1.65. [4]@2.50. [5]@3.85. [6]@5.00. [7]@7.50.

Wisconsin Puts Cement Buying Up to Road Contractors

THE state of Wisconsin this year is to make a departure from its usual practice of purchasing all cement used in state road work and then allotting it to the contractor. The reason for the change is given in the following, which is taken from an Associated Press dispatch printed in a Madison, Wis., newspaper:

"Road contractors are able to purchase cement at lower prices than the state, due to 'sharp bargaining,' recent experiences indicate to the state highway commission. As a result, the commission feels its attitude in declining to contract for cement this year unless the contract contained a cancellation clause, is justified.

"On December 29, bids were asked for approximately 900,000 bbl. The cement companies bid on 150 destinations and bid practically the same price per barrel at each destination, regardless of the difference in freight rates. After discussing the matter with Governor Blaine, the highway commission decided to accept the bids, though they were not satisfactory, providing the cement companies would agree to a clause in the contract permitting the commission to cancel their requirements for any specific job and buy on the open market. The commission said it believed that cement was being sold at prices lower than those quoted.

"The cement companies refused to sign the contract containing the cancellation clause. As a result the commission is letting contracts with the provision that the contractor furnish the cement and include the cost in the price bid per square yard of pavement."

Missouri Portland Cement Company Expands Gravel Operations

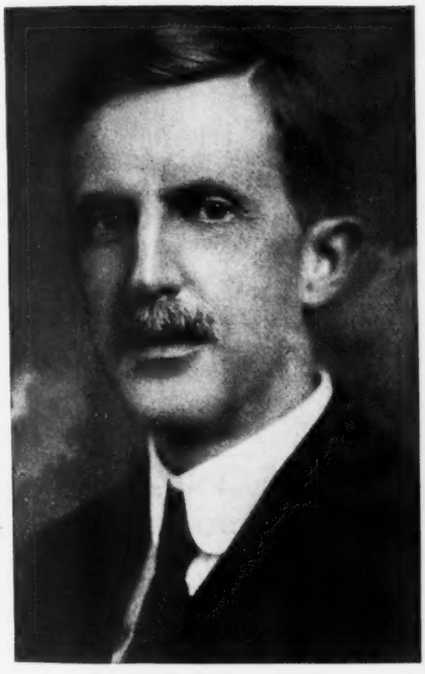
THE Missouri Portland Cement Co., St. Louis, Mo., has purchased the gravel plant of the Denton Service Co., near Pacific, Mo. With the purchase is a lease of over 500 acres of land all underlaid with gravel. The company owns and operates other sand and gravel plants at Memphis, Tenn., and Prospect Hill, Mo., besides a crushed stone plant at Sugar Creek, Mo., and the cement plants located near Kansas City and St. Louis, Mo.

National Slag Association Re-elects Officers

THE National Slag Association, Cleveland, Ohio, held its ninth annual meeting in the Old Colony club in Cleveland on April 9. Every director was present.

The honor guest of the convention was P. H. Bates of the U. S. Bureau of Standards.

During the annual business sessions the following officers were elected to succeeed themselves for the coming year: President, C. L. McKenzie, president, Duquesne Slag Products Co., vice-president, C. E. Ireland, vice-president, Birmingham Slag Co., Birmingham, Ala.; secretary-treasurer, H. J. Love, 933 Leader-News building, Cleveland, Ohio.



C. L. McKenzie, president, National Slag Association

Canadian Steel Company Operates Modern Limestone Quarry

ONE of the Dominion Iron and Steel Co.'s limestone quarries is located at Port-au-Port Bay on the west coast of Newfoundland, about 200 miles from Sydney Harbor. The property consists of 640 acres of limestone said to hold about 100,000,000 tons of stone. It is equipped with the latest type of quarrying, crushing and stone handling plant. A shipping pier at which 13,000-ton steamers have loaded has facilities for loading 1000 tons per hour.

The quarry is one of the largest of its kind, the working face being 80 to 100 ft. in height and extending for a length of about 1200 ft.

Primary blasting is carried out by putting down well drill holes 6 in. in diameter and as deep as 110 ft. in some cases. These are spaced 20 ft. apart along the face of the quarry and an entire section is charged and brought down with one blast. Upwards of 100,000 tons has been taken down in this way by a single shot. The stone is loaded by steam shovels into quarry cars, crushed to a suitable size for the blast furnaces at Sydney and stored in bins for shipment. The storage bins have a capacity of 36,000 tons.

During the past two years the limestone required to supplement stocks on hand at the steel plant was obtained from Point Edward quarry, which is near Sydney and was intended primarily as a source of limestone for the open hearth furnaces. It is equipped to supply 450 tons of stone per day.

Ash Grove Lime and Portland Cement Company Increases Capacity

THE work on the lengthening of the kilns at the Ash Grove Lime and Portland Cement Co.'s cement plant at Chanute, Kan., which was started last July, has been at last completed and the kilns in operation. The five kilns were increased from 125 to 180

C. E. Ireland, vice-president, National Slag Association

ft. in length and provide an increase of 25% over the present capacity of about 1,250,000 bbl. annually. Although these kilns were practically rebuilt, the plant has been in constant operation and was only shut down for a brief period to make the necessary repairs and connections to the new stack which is over 300 ft. high.—*Chanute (Kan.) Tribune.*

Ohio Valley Sand and Gravel Company Sold by Receiver

A RECENT notice from Charles Wassman, receiver of the Ohio Valley Sand and Gravel Co., Bellaire, Ohio, states that the property has been purchased by J. H. Robinson of Bellaire for $24,000. Mr. Robinson is said to be acting for other parties and that a new corporation has been formed which will operate the plant.

The Ohio Valley Sand and Gravel Co. was placed in the hands of a receiver on January 19, 1926. The property was appraised at $23,328, and liabilities approximated $48,000, with secured claims at $23,000. The plant is located on the Pennsylvania railroad, about nine miles south of Bellaire. The sand and gravel produced has heretofore been marketed in the Wheeling, W. Va., district.

Texas Quarry Companies Reorganize

THE corporations known as the Texas Stone Products Co. and the Chico Crushed Stone Co. have been dissolved and reorganized as one corporation under the name of the Chico Stone Products Co. and which succeeds to the business of the two dissolved corporations and assumes all contracts.

The management and business affairs of the two companies has been identical for a considerable period. No change in personnel is involved in the reorganization, the merger being merely to simplify operations and facilitate consumer service. The quarries and crushing plant are equipped to produce about 2000 tons daily of concrete aggregate and highway material. E. C. Dodson is president and treasurer and W. J. Briggle, superintendent.

H. J. Love, secretary, National Slag Association

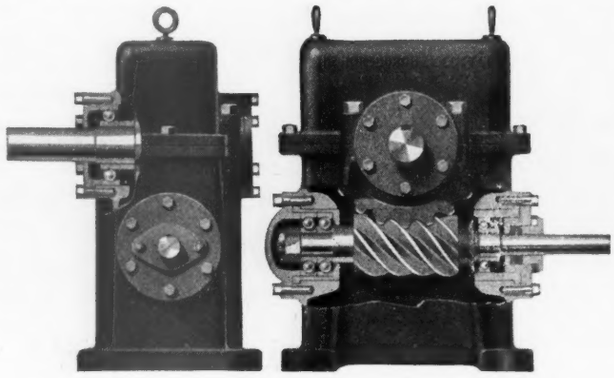
New Machinery and Equipment

New Worm Gear Speed Reducers

A SINGLE UNIT of worm gear speed reducer designed for reduction up to 100 to 1 is announced by Horsburgh & Scott Co., Cleveland, Ohio. It is made in three types. Type B, as illustrated, has the worm below the gear, Type T has the worm above the gear, and Type V with the gear shaft vertical For larger reductions, which must be cared for in one housing, the company has a double reduction type said to be capable of making ratios of 3000 to 1 and over.

The worm of the Horsburgh & Scott worm gear speed reducer is a solid forging of low carbon steel, carbonized case hardened and ground all over, including the thread surfaces. The gear is of gear bronze hobbed on machines of approved design. The housing is a grey iron casting with heavy external ribbing and ample wall and flange sections, it is claimed, to resist distortion.

The size and mounting of the gear shaft, it is said, is determined by the character of the load that the unit will be called upon to transmit. Where the load is principally torque, a lighter shaft and ball bearings may be used; where it is torque with a light suspended load, roller or journal bearings and a slightly heavier shaft may be used; but where it is torque with a heavy overhung load, extra heavy bronze journal bearings and extra large diameter shafts, it is said, must be used. Because of special design, the makers claim that all of these conditions can be cared for in the same standard type of housing of the worm gear speed reducer with slight changes in the design of the small parts to take care of the different types of bearings and the variations in the shaft diameters. In all cases, however, it is said, the diameter of the gear shaft is oversize with a liberal load factor.



Views of worm gear speed reducer showing bronze journal bearings (left) and details of gear mounting and ball bearings (right)

New Gear Drive Gas Locomotives

A FULL new line of gasoline locomotives of the gear drive type, ranging in size from 8 to 20 tons, is announced by the Davenport Locomotive Works, Davenport, Iowa.

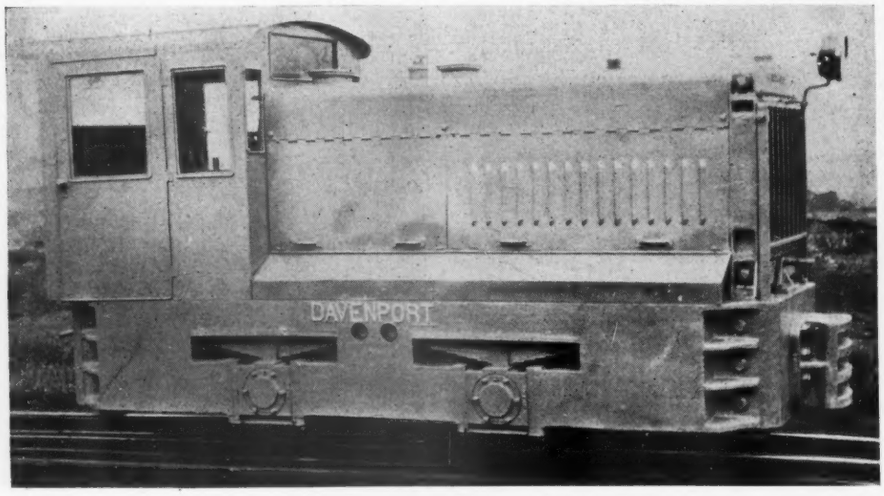
In these locomotives, geared transmission replaces the roller chain transmission and individual wheel drive of the present Davenport gasoline industrial locomotives.

Many new features of design and construction are claimed to have been incorporated, among which is a three-point suspension principle with cross equalizer said to give improved tracking qualities. By use of semi-elliptic springs wider distribution of stresses and better dampening of shock is said to be obtained. A fully enclosed, all steel cab is provided.

An open, accessible design has been used in these machines which is said to facilitate adjustments and repairs. The master clutch is a step jaw clutch which because it is always halfway in when the faces are engaged, is said to eliminate the possibility of chipped corners on the clutch faces. Reduced clearance is said to be made possible by this construction.

Both engine and transmission have individual force feed lubrication systems with pressure gages in the cab. Alemite fittings are provided for the journals at the driving wheel.

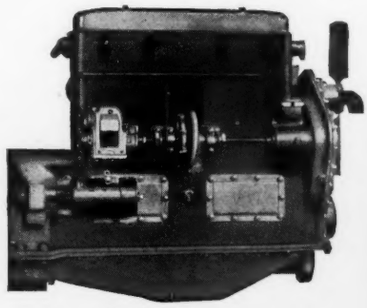
Climax engines are used--six cylinders in the 16- and 20-ton sizes and four in the 8- and 12—with four speeds forward and four reverse. Both speed and direction selection clutches slide on splined shafts and lock automatically in position.



Gasoline locomotive with geared transmission

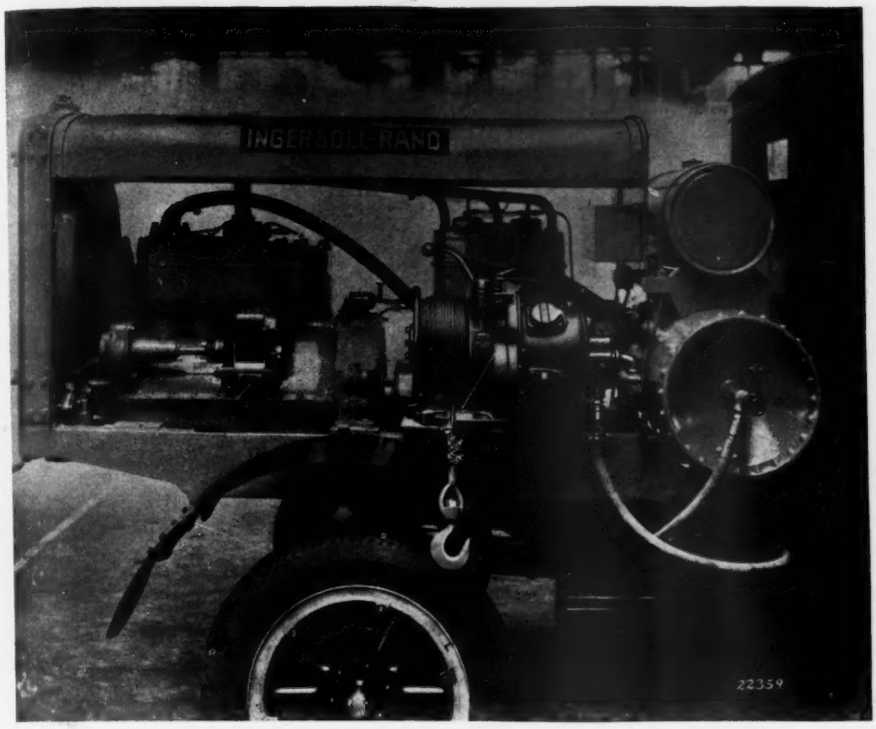
New Industrial Engine

A FOUR-CYLINDER motor engine said to develop 28 hp. at 600 r.p.m. up to 56-hp. at 1400 r.p.m. is announced by the Sanderson-Cyclone Drill Co., Orrville, Ohio.



Four-cylinder industrial engine

This engine, known as the W-S-M, was formerly made by the WellmanSeaverMorgan Co., Cleveland, Ohio, and is of the 4-cycle, valve-in-head type motor with a bore 4¼ in. and a 6-in. stroke. Good features in the design are said to consist of easily removed cylinders, replacement of the connecting rods and pistons from either top or bottom of the motor, cylinder head which carries as a unit the valves, rocker arms and springs, hole plates for motor inspection, good design of oil pan, all moving parts lubricated



Air motor hoist mounted on portable compressor on small truck

under pressure, chrome nickel shaft and machine finished combustion chamber with overhead valves and exhaust manifold which is said to decrease greatly the deposition of carbon.

Small Air Hoist for General Utility Work

A NEW size DU "Utility" air motor hoist has been developed by the Ingersoll-Rand Co., New York City. This size DU hoist has been especially designed for use with portable compressors and is said to be suitable for a wide variety of work such as hauling or lifting rock, boulders, for laying culverts, for hauling a scraper and other pulling and hoisting jobs. It can also be used, it is said, to haul the compressor for a short distance.

The new hoist is of the winch type and is provided with mountings by which it may be attached to the rear end of a 5½x5 or a 5x5 portable compressor, to the side of the larger compressors, or to compressors mounted on Ford trucks. It is said to be capable of exerting a rope pull of 1000 lb. and of taking 350 ft. of 5/16-in cable. A swivel bolt through the bottom of the base permits the hoist to be swung around into any desired position.

It is equipped with a clutch so that the cable can be played out by hand or by a down grade load without turning over the motor. A hand brake on the drum is provided to check the unwinding and stop it in any desired position. The throttle control is said to be very sturdy and so sensitive that any speed of rope travel can be obtained.

Air consumption on this type of hoist is said to be very economical and a 5½x5 portable compressor is said to be sufficient to operate it even under heavy loads.

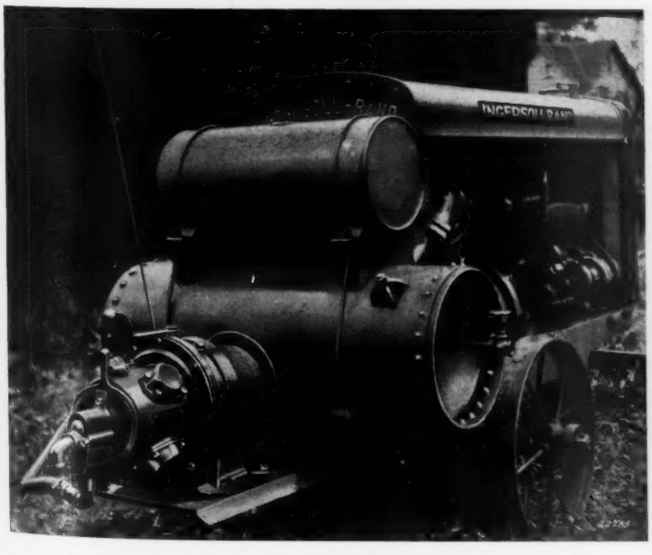
Efficiency of Electric Shovels

THE following experience in the use of electric shovels at the quarry is furnished by the General Electric Co., Schenectady, N. Y.:

Increased output in a shorter period of time, together with a reduction in labor, resulted from the installation of an electric shovel by the Cowell Portland Cement Co. at Cowell, Calif. It was found that six cars could be loaded with the electric shovel while the steam shovel was loading five even though the dipper on the steam shovel had a capacity of 3 cu. yd., while the electric shovel had a dipper of but 1¾ cu. yd. capacity. The electric shovel was operated by a steam operator who had no previous experience with electrical equipment.

The electric shovel was a Marion model No. 37, the electrical equipment for which was furnished by the General Electric Co. Power was supplied from a 2300-volt transmission line running from the mill substation to the quarry where, by means of transformers, the voltage was stepped down to 440 and converted into direct current by the motor generator on the shovel.

The number of men required to operate the shovel was only three as compared with nine required by the steam shovel. Approximately three-fourths of the time necessary to move from one location to the next, it is claimed, was saved by the electric shovel, as temporary roadbeds and tracks were unnecessary.



Hoist mounted on rear end of portable compressor

Hoist with winch head in place of rope drum

Purchase Equipment for New Cement Plant Now Building in Buffalo

PRELIMINARY excavation and construction work has been started on the new cement plant at Buffalo, N. Y., which is being built by the Great Lakes Portland Cement Co., the details of which were published in ROCK PRODUCTS, March 6 issue. The sketch, reproduced below, is the general layout of the new plant, which it is expected will cost about $1,500,000. General contract for the erection has been awarded to the Burrell Engineering Co., Chicago, Ill.

According to Adam L. Beck, the president of the company, most of the large equipment has been purchased. This includes four kilns, 11x250 ft. and four clinker coolers, 9x90 ft., all furnished by Reeves Brothers Co., Alliance, Ohio. Compeb mills, 8x30 ft., for both the raw and finish grinding, are of Allis-Chalmers make, the coal pulverizing machinery is from the Raymond Bros. Impact Pulverizer Co., Chicago, and the Kinyon cement pumps were purchased from the Fuller Co., of Catasauqua, Penn.

A 42-in. gyratory crusher has been bought from the Allis-Chalmers company and will be installed at Rogers City, Mich., where the company is reported to have acquired about 2000 acres of high calcium limestone property. Mr. Beck stated that the company expects to produce about 2,000,000 tons of crushed stone per year and perhaps ship some of this to nearby cities on the Great Lakes where there is a good market for high calcium stone. All water shipments would provide a low transportation cost and permit favorable competition with other producers.

Peninsular, Great Western and Fredonia Portland Cement Companies in Merger

FORMATION of the Consolidated Cement Corp., with an authorized capital of $35,000,000, to operate a system of plants manufacturing portland cement, was announced by E. H. Rollins and Sons, Chicago, Ill.

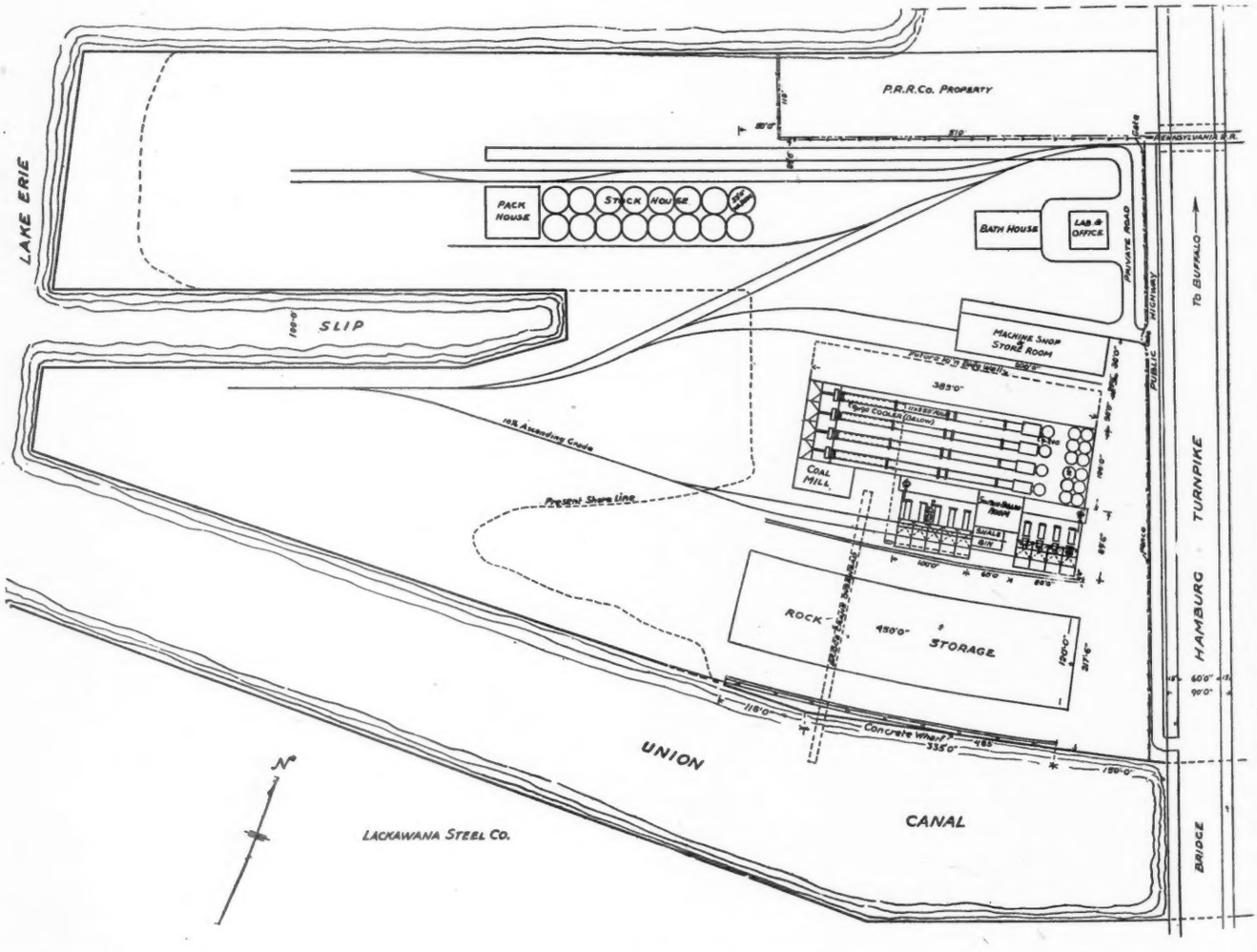
The companies entering the merger are the Peninsular Portland Cement Co., of Cement City, Mich., one of the Cowham System plants; the Great Western Portland Cement Co., of Mildred, Kan., and the Fredonia Portland Cement Co., of Fredonia, Kan.

Appraisal of the properties already acquired by the Consolidated has been placed at $7,500,000. Approximately 2,750,000 bbl. of cement were produced by the three concerns operating individually in 1925, and with the addition of new kilns and other equipment now being installed, the combined capacity of the three plants it is said, will be in excess of 3,000,000 bbl. per year.

The Peninsular company was one of the original cement producing companies in the Middle West, having been organized in 1899. Both the Fredonia and Great Western companies are well known in the midwest territory.

The new corporation is to be operated by the Cowham Engineering Co. of Chicago, according to the announcement, and John L. Senior, president of the Cowham company, will become president of the Consolidated.

Capitalization of the Consolidated upon completion of present financing plans will include a $4,000,000 first mortgage sinking fund gold bond issue; a $1,100,000 convertible gold note issue; an issue of $1,465,400 of 7% cumulative preferred stock, and 100,000 shares of no par common stock.



General layout of the new cement plant, now under construction at Buffalo, N. Y., by the Great Lakes Portland Cement Co.

New Lime Plant for Arizona

A NEW 4-KILN lime plant of 70 tons daily capacity is now under construction at Radium, Ariz. It is expected that the lime made will be of good quality, for analyses of the limestone rock show it to be high calcium stone. The local mining companies in the district will probably use the most of the new plant's output, as they are large consumers of lime for use in the flotation process, and at present are having lime brought in from kilns at outside points. A larger increase of lime in the locality for building purposes is also expected when the new plant begins production because of a decrease in price due to elimination of hauling charges.

The deposit to be worked lies in vertical cliffs about 100 ft. high and 2000 ft. long, with a limestone wedge of about 600 ft. The kilns will be located underground at the base of the cliffs and thus eliminate to a great extent losses from heat radiation and troubles due to weather changes. Four drifts, each 35 ft. in length, are being driven into the cliff. From the inner end of the tunnels, raises 6 ft. in diameter and 40 ft. in height, are being driven to the surface. These upper chambers constitute the kilns, which will hold 80 tons of material each.

The finished product will be drawn off at the bottom in mine cars and hauled to the loading and storage bins located at the portals of the short tunnels. The natural configuration of the deposit, of which full advantage has been taken in the plans for the plant, will permit the crude rock to be carried directly into the kilns by gravity chutes.

Air compressors and power drills have already been installed at the plant and all drilling operations will be carried on with power drills. The initial preparations for the burning of lime at the Radium plant represent an investment of about $15,000. Coal will be used for fuel at the plant.

The preparation of crushed rock for road surfacing and structural purposes will also be carried on in conjunction with the lime plant operations.

The kilns are being installed by H. E. Hoopes of Safford, Ariz., and management of the plant will be under John L. Hoopes.

W. A. Rowe Elected President of Wissota Sand and Gravel Company

W. A. ROWE, general manager of the Wissota Sand and Gravel Co. of Eau Claire, Wis., has been elected to the office of president of that company to succeed L. G. Arnold, who has resigned to give more attention to his work in the contracting business as manager for A. Larson and Co.

Mr. Rowe has been identified with the company for several years, having been in active charge of production and plant construction. He also designed and built the washed sand and gravel plant at Chippewa Falls.

Two years ago the demand for agstone and crushed rock in northwest Wisconsin got to such a stage that Wissota had to expand by purchasing the old Spring Valley quarry near Elmwood, Wis. Mr. Rowe had charge of the design and building of the new plant which is said to be a model for cheap quarrying and efficient handling of the product, the quarry floor being 150 ft. above the loading tracks.

Large Merger of Cut Stone Quarries Completed

COMPLETION of the $50,000,000 merger of limestone companies in the Indiana quarry district was recently announced by Lawrence Whiting, Chicago banker, who will head the corporation as chairman of the board of directors.

The new concern, to be known as the Indiana Limestone Quarries Co., will coordinate operations of 70 plants and quarries. It will have a yearly production capacity of 12,000,000 cu. ft. of cut limestone.

The other officers will be A. E. Dickinson of Bedford, Ind., president; Thomas J. Vernia, Chicago; Morris McGrath and M. E. Joyner, both of Bedford, Ind., vice-presidents; Charles F. Walter, Cleveland, chairman of the executive committee. Among the companies in the corporation are the Indiana Quarries Co., Chicago; Construction Stone Co., Bedford, Ind.; W. McMillin and Sons; Shea and Donnelly of Boston; Furst-Kerber Cut Stone Co, Chicago; Crescent Stone Co. of Bloomington, Ind., and the Imperial Quarries Co.—*Chicago (Ill.) Post.*

Great Northern Railway to Build Gravel Plant

ACCORDING to the Seattle (Wash.) *Journal of Commerce,* the Great Northern railway is to erect at a cost of $150,000, a crushing and washing plant at Reiter, Wash. A Bucyrus shovel operated by a Diesel engine will be used to load gravel from the pit onto cars and hauled by gasoline locomotives running on a narrow gage track to the electrically-operated crushers which are to be installed. The gravel produced will be used on a large rail replacement project contemplated by the railroad between Gold Bar and Monroe.

New Company To Dredge Sand and Gravel in Canada

FRANK M. ROSS, of the George Hall Coal Co., announces that James Playfair and some of his associates, have purchased the sand and gravel business of T. C. Simpson, who holds the rights for the dredging of sand in the Lake of the Two Mountains. The new company will be fully equipped with modern floating and handling equipment to economically handle from 250,000 to 350,000 tons of sand per year.

The new company, which will be known as the Oka Sand and Gravel Co., Ltd., have leased from the Ogdensburgh Coal and Towing Co. their large and well equipped storage yards for the handling and storing of sand under cover. This plant is located on the city side of the canal.

The directors and officers of the new company will be as follows: James Playfair, president; F. M. Ross, vice-president; V. G. R. Vickers, Dr. W. L. MacDougall, G. L. Campbell, T. C. Simpson, F. A. Augsbury, Donat Raymond. A. Hutchison will be commercial manager.

Lime Plant Damaged by Fire

THE plant of the Limeton Lime Co., located at Karo, Va., three miles south of Front Royal, was greatly damaged by recent fire of unknown origin. A new $25,000 hydrating plant had been installed about a year ago. The company's main office is at Front Royal, with R. E. Herr, manager. The loss is estimated at about $35,000, partly covered by insurance.—*Petersburg (Va.) Index.*

Slate Roofs

THE second of a series of informative literature on slate and its uses has just been published by the National Slate Association, entitled "Slate Roofs." This publication is a result of the active coöperation of architects, slate producers and distributors, roofing contractors, government departments, manufacturers of accessories, and many other individual authorities. In bringing forth this hand book on slate roofs, the National Slate Association was actuated by the desire to supply reliable and efficient information on slate and its proper application, which in turn will make for the more executive and appropriate use of slate, besides supplying information on formation and quarrying to users of slate.

The classification of slate roofs is included as follows: standard, textural, graduated, and flat slate roofs. A brief description, detailed information and specification of each type is given. An outline of the American roofing slates, giving color designation, where quarried, and a brief description is given.

Although the retail price is $1.50 per copy, complimentary copies of this publication for architects, builders or large specifiers of slate may be had by sending an order on letterhead to the National Slate Association, 791 Drexel Building, Philadelphia, Pa. Slate roofing contractors may obtain their copies by addressing the slate concerns from whom they buy their slate.

News of All the Industry

Incorporations

The Service Gravel Co., Marysville, Mich., $24,000.

Consolidated Feldspar Mines, Toronto, Ont., $100,000.

Seaboard Rock Corp., Miami, Fla., $1,000,000. P. L. Carlton and others.

Kent Tile and Marble Co., Ltd., Hamilton, Ont., $100,000. E. E. Kent and others.

Spencer Quarry Co., Spencer, S. D., increased capital stock from $50,000 to $75,000.

Memphis Concrete Pile Co., Memphis, Tenn., $50,000. O. H. Miller, Rand building, Memphis.

Ross Island Sand and Gravel Co., Portland, Ore., $1000. Ralph Schneeloch and L. L. Gilstrap.

Chico Stone Products Co., Dallas, Texas, $300,000. E. C. Dodson, Clara Cleft and J. D. Kuegle.

Everett Concrete Products Co., Everett, Wash., $6000. Hans Mumm, Jr., A. W. Swartz and F. L. Martin.

Schumacher Corp., Wilmington, Del., $5,000,000. To operate gypsum mines, etc. (Corp. Trust Co. of America.)

Dolton Concrete Block Works, Dolton, Ill. Changed name to Dolton Concrete Products and Material Co.

Marshall Sand Co., Black Mountain, N. C., $30,000. G. C. Buquo and Charles Stirwalt, both of Asheville.

Philadelphia Concrete Products Co., Wilmington, Del., $200,000. Manufacture of cement, lime, plaster and artificial stone.

Exner Sand and Gravel Corp., New York, N. Y., $30,000. J. and H. E. Exner and L. Luedeke. (Att'y, L. E. Felix, 217 Broadway, N. Y.)

Hampton Gravel Corp., Southampton, N. Y., $6000. J. D. Stager, L. P. Ward and I. Shalsey. (Att'y, First National Bank, Southampton.)

Independent Cement Block and Material Co., Rosland, N. Y., $12,000. P. E. Sigler, H. K. Pier and E. T. Taylor, Jr. (Att'y, W. G. Bradley, Caldwell, N. Y.)

Morse Sand and Gravel Co., Pawtucket, R. I., $25,000; 250 shares common, $100 each. Alfred H. Morse and Lillian B. Morse, Cranston; Geo. V. Morin, Pawtucket.

Battjes Gravel and Sand Co., Grand Rapids, Mich., $50,000. H. N. Battjes, W. J. Breen and Dewey Battjes. Office at 327 Michigan Trust building, Grand Rapids.

California Stucco Products Co. of New England, Inc., Cambridge, Mass. Deal in cement products. 500 shares, no par value. Walter E. Brownell, Napoleon M. Bernier, 411 Walden street, Cambridge, and Walter C. Voss.

Quarries

Wagner Quarries Co., Sandusky, Ohio, have recently received what is regarded as the largest order for crushed stone in the locality. The order calling for 400,000 tons, is to be used in the construction of a $5,000,000 sewage disposal plant near Akron.

Berkshire Gravel Co.'s plant at Lenoxdale, Mass., was damaged by recent fire to the extent of about $10,000. The fire, believed to have started from an electric transformer, destroyed the hoisting room and machinery.

Sand and Gravel

Moraine Gravel Co., Plymouth, Wis., has purchased the plant and holdings of the Waupaca Sand and Gravel Co., located near Amherst, Wis. The Waupaca company's plant had an annual production of 90,000 cu. yd. of washed and screened sand and gravel.

Acme Sand and Gravel Co., Allentown, Penn., has purchased a tract known as the old Rhoads farm at New Hope, N. J. The land will be developed for its sand and gravel resources and railroad sidings run to connect it with the line of the Philadelphia and Reading railroad.

L. G. Everist Co., Sioux City, Iowa, has purchased 80 acres of gravel land at Hawarden, Iowa, on which it will open a plant.

Sonoma Gravel Co., San Francisco, Calif., has changed its office from the Flood building to the St. Clair building.

J. P. Wilkinson, receiver of the Morgan and Byrd Gravel Co., Shreveport, La., was served with a restraining order prohibiting for the present the sale of the property to satisfy a $30,000 mortgage. The federal court issued the order on the petition of T. G. Roberts.

Cement

Canada Cement Co., Ltd., Montreal, Que., are making changes in the crushing equipment at Point Anne, Ont., which will increase the daily capacity from 2000 to 3000 tons or more. When the changes are completed employment will be given to 30 or 40 additional hands.

Pennsylvania Cement Co., New York, has awarded a general contract to the Turner Construction Co., for additions to its plant at Portland Point, N. Y., consisting of one-story machine shop, packing mill, storage and distributing building, to cost $250,000 with equipment.

New Egyptian Portland Cement Co., Detroit, has awarded a general contract to the MacDonald Engineering Co., Chicago, for a four-story and basement addition to its mill at Port Huron, Mich., 50x70 ft., to cost $200,000 with equipment.

Warrior Cement Corp., Chattanooga, Tenn., is building warehouses at Mobile and New Orleans and making extensive improvements at the Ivy Bluff coal mine.

Cement Products

Kibber Cement Works, Lake Wales, Fla., is to build a new plant on the Seaboard railroad tracks with G. M. Wicker as general manager.

Lackawanna Concrete Block and Builders' Supply Co., Lackawanna, N. Y., suffered a $5000 damage to its plant through a recent fire.

Sherman Concrete Sewer Pipe Co., Knoxville, Tenn., is erecting a branch plant at Wauchula, Fla. The company has five other plants at different cities in Fla.

A. B. White has taken over the interest of the late D. W. Russell, in the Anamosa Cement Products Co., Anamosa, Iowa. The business will be conducted by Mr. White and C. W. McMahon, the surviving partner.

Hume Pipe Co., Melbourne, Australia, who operate over 30 plants in that country and several in New Zealand, are planning to establish a plant at Vancouver, B. C., for the manufacture of concrete pipe by the Hume patent.

Grants Pass Concrete Construction Co. has purchased the business of the Oregon Cement Sewer Pipe and Tile Co., in Grants Pass, Ore.

Castone Products Co., Cedar Rapids, Iowa, manufacturers of roofing tile and trim stone, is building a new factory, which will be completed this month.

Lincoln Concrete Block Co., of Lincoln, Neb., has changed its name to the Cinder Concrete Block Co.

Uniform Mixed Concrete Corp., Los Angeles, Calif., will build $6500 addition to its rock plant at Victory boulevard, San Fernando Annex.

Lime

Port Byron Lime Association's lime plant at Port Byron, Ill., which has been idle for about a year will be reopened soon with Lincoln Trent of Rock Island, Ill., as manager.

Gypsum

Structural Gypsum Corp., incorporated in Delaware, has been granted an Ontario license to manufacture and deal in plaster, cement, limestone, gypsum, brick, stone, etc.

British Columbia Gypsum Co. have started operations at New Westminster, B. C., employing about 50 hands. The plant cost $200,000 except the plaster board branch which will be completed shortly.

Phosphate Rock

Phosphate Mfg. Co., Savannah, Ga., has concluded negotiations for the purchase of the local mill of the Phosphate Mining Co., for $300,000 and will take over the property on June 1, continuing the production of acid phosphate, fertilizers, etc. Plans for extensions and improvements are under consideration.

Sand-Lime Brick

Winchester Granite Brick Co., Winchester, Ky., is now under the management of Mrs. G. N. Wyckoff. The board of directors appointed Mrs. Wyckoff to succeed her husband, who up to his recent death at Rochester, Minn., had been general manager of the company for several years. The company produces sand and gravel in addition to the making of sand-lime brick and has a plant at Dudley, Ky.

Burt Brothers, Palatka, Fla., are planning the establishment of a plant for the manufacture of sand-lime brick. No machinery has yet been purchased.

Miscellaneous Rock Products

Florida Diatomite Syndicate, Eustis, Fla., is reported to be planning the erection of a plant at one of the deposits near Eustis and to enlarge their plant at Clermont, Fla.

El Dorado County Slate Products Co., has begun operations at its quarry just outside the city, on the north side of Placerville, Calif. A new air compressor has been installed at the plant.

Personals

Sewell Avery, president of the U. S. Gypsum Co., was recently elected a director of Armour and Co., Chicago, Ill., and of the Chicago, Great Western railway.

T. E. Sharples has been made assistant quarry superintendent of the U. S. Gypsum Co.'s lime plant at Genoa, Ohio. Mr. Sharples was formerly superintendent of the Standard Lime and Stone Co., Havre de Grace, Md.

Harold Kuehn has been made office manager of the Elliston Lime Co., Helena, Mont.

John R. Morron, president of the Atlas Portland Cement Co., was recently elected a director of the Intercontinental Rubber Co.

Hugh Haddow, Jr., and **V. P. Ahern**, president and executive secretary, respectively, of the National Sand and Gravel Association, were recently in Houston, Texas, to confer with local sand and gravel producers.

Paul C. Van Zant, chief engineer, and **J. E. Griffith**, superintendent of the Ideal Cement Co.'s new plant being built northwest of Fort Collins, Colo., were guests of the directors of the Fort Collins Chamber of Commerce at one of their recent meetings.

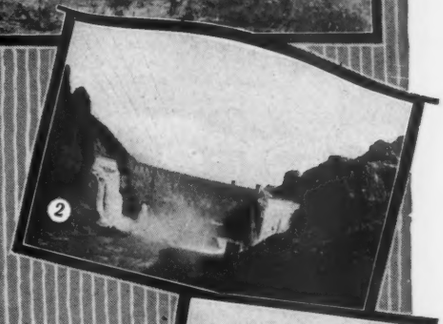
Manufacturers

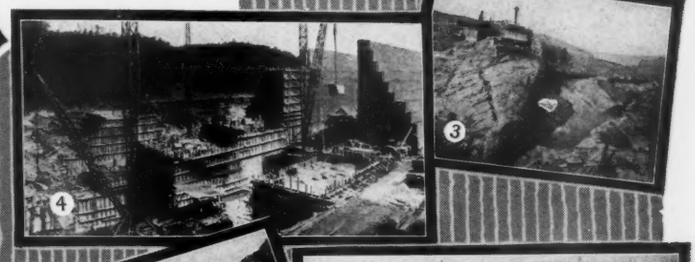
John P. Leary and **L. H. Sonneborn** have formed the firm of Leary and Sonneborn, chemical brokers, with offices at 133-137 Front St., New York. Previously they were connected in various capacities with the American Smelting & Refining Co.

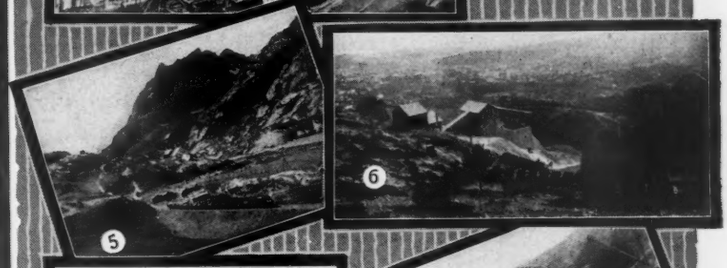
Harnischfeger Corp., Milwaukee, announce the appointment of the Clark-Wilcox Co., 17 Lafayette Street, New Haven, Conn., and also at 786 Albany Street, Boston, Mass., in place of the K. B. Noble Co. of Hartford, Conn., and of Wm. H. Hale Co., as agents in the state of Minnesota, with headquarters at 607 Fifth Avenue, South, Minneapolis, Minn.

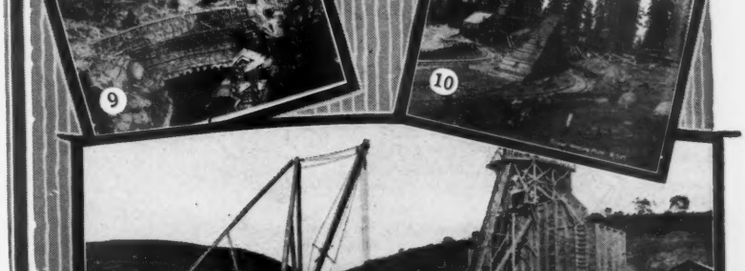
Manitowoc Engineering Works, Manitowoc, Wis., have completed and shipped two rotary coolers, 5x50 ft., and one rotary kiln, 8x150 ft., to the U. S. Gypsum Co.'s lime plant at Genoa, Ohio. The second kiln of the same size is now being built and will soon be shipped.

Some Notable Achievements of Engineering History









Large Dams, Irrigation Projects, etc.

In which Allis-Chalmers Engineering Service and Equipment have been Important Factors

1. Quebec Development Co., Isle Maligne Development. Complete rock crushing plant. Allis-Chalmers hydraulic turbines developing 540,000 H. P. are also being installed.
2. Roosevelt Dam, Elephant Butte, Arizona. Complete cement plant.
3. Ebro Dam, Barcelona, Spain. Crushing and cement plant.
4. Locks and Dam No. 17, Black Warrior River, Alabama, U. S. Government. Complete crushing plant.
5. Barberine Dam — Switzerland. Crushing, washing and screening plant.
6. Naval Dry Docks, Toulon, France. French Government. Crushing plant complete with motor drive.
7-8. Cheoah and Badin Dams and power plants, Yadkin River. Tallassee Power Co. In addition to the crushing plants used in construction, Allis-Chalmers hydro-electric units are installed in power plants.
9-10. Southern California Edison Co. Allis-Chalmers crushing equipment used in the construction of five large development projects as well as hydraulic and electrical machinery in several power plants.
11. Reservoir Dams, Government of Brazil. Rock crushing and cement grinding plants.

Arrow Rock Dam, near Boise, Idaho.
Panama Canal, Panama. Crushing plant at Colon.
Wilson Dam, Muscle Shoals, Tennessee River.
Lookout Shoals Development, near Catawba, N. C. Southern Power Co.
Tallulah Falls, Tallulah, Georgia. Georgia Railway and Power Co.
Goat Rock Development, Chattahoochee River, near Columbus, Ga. Columbus Power Co.

Let Allis-Chalmers Engineers Serve You.

ALLIS-CHALMERS

MILWAUKEE, WIS. U.S.A.

When writing advertisers, please mention ROCK PRODUCTS

Rollway Bearing Co., Inc., Syracuse, N. Y., have made the following changes in their sales personnel: C. A. Call, formerly assistant sales manager has been appointed sales manager; E. J. Lybert has been transferred from the Philadelphia district to the Detroit district; W. E. Smith has been transferred from the home district to the Youngstown district, where he will assist Samuel Farrell, and J. D. Firmin has been appointed representative for the Philadelphia district.

Westinghouse Electric and Mfg. Co., East Pittsburgh, Penn., has made a complete reorganization of the sales department, involving the reallocating of the managing personnel and the creating of several new activities. Among the important changes are as follows: E. H. Sniffin, formerly manager is now assistant to the vice-president, and T. J. Pace, formerly manager of the supply department has become director of sales.

George W. Heald, representing the Strong-Scott Mfg. Co., Minneapolis, Minn., announces his location at 53 West Jackson boulevard, Chicago, Ill.

Link-Belt Co., Chicago, Ill., have recently announced that Nelson Brandt has rejoined their sales management force, and that he will manage a new branch office which is to be opened up in Florida.

W. C. Davis was recently re-elected president of the Foote Bros. Gear and Machine Co., Chicago, and E. H. Vogt, former auditor and credit manager, elected secretary and assistant treasurer.

General Motors Truck Co., Detroit, Mich., announces that a large symbolic trophy of silver has been awarded them by the Russian government as first award for economical truck transportation in Russia. A picked group of American and European trucks competed in the test run of 3300 miles which lay over long stretches of barren steppes and across mountain range trails. A point system was used as a basis for the award, the performance, repair items, etc., being registered.

Trade Literature

NOTICE—Any publications mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

Rock Products Development. Bulletin No. 26 which contains some interesting information on drilling and mining in the rock products industries. Illustrations and description of diamond core drills. Specifications, capacities, etc., 12 pp. 6x9 in. E. J. LONGYEAR CO., Minneapolis, Minn.

Cement Products Equipment. Bulletins on deck racks for block and tile, hand and automatic machine strippers, automatic face down and stripper building tile machines, etc. Description of operations, data on design, construction, etc. BESSER SALES CO., Chicago, Ill.

C-E Unit System. Catalog U-1 describing and illustrating the C-E unit system for burning pulverized coal by the direct fire method. Details on design and operation and data on construction of the system. 16 pp. 8½x11 in. COMBUSTION ENGINEERING CORP., Broad Street, New York, N. Y.

Skid Excavators and Dredges. Bulletin No. 665 describing and illustrating types of Hayward buckets and their use in connection with Hayward skid excavators and dredges. 20 pp. THE HAYWARD CO., New York, N. Y.

Green Forced Draft Stoker. Catalog GFD-1 describing forced draft stokers for use with different grades of coal. Illustrations of design and construction, details, etc. COMBUSTION ENGINEERING CORP., Broad St., New York, N. Y.

Autocar Trucks. Illustrated booklet showing types of trucks in use in various rock products industries. AUTOCAR CO., Ardmore, Penn.

Steam Shovels. Handsomely illustrated catalog on Type 22, Massillon steam shovels showing details of construction and design. Contains specifications, capacities, engineering diagrams. 22 pp. 8½ x 11 in. THE RUSSELL CO., Massillon, Ohio.

Transmission Capacity of Belts. Report of experiments at Cornell University to determine the relative power transmitting capacity of belts on vertical, angular, and horizontal drives. LEATHER BELTING EXCHANGE, Philadelphia, Penn.

Multiple Retort Underfeed Stokers. Bulletin No. 103 describing and illustrating these types of stokers. Feature level full bed and control method of fuel movement. Applications, uses and designs. 24 pp. DETROIT STOKER CO., Detroit, Mich.

Specification for Use of Celite. Bulletin No. 317 containing specifications covering diatomaceous silica as an admixture in concrete and typical specification clauses covering the use of Celite as an admixture. Includes directions for use of Celite. CELITE PRODUCTS CO., Los Angeles, Calif.

Centrifugal Pumps and Air Comprsesors. Bulletin No. 207 on the Pennsylvania multi-stage centrifugal pumps and No. 127 on the Pennsylvania direct-connected synchronous motor driven air compressors. Description and illustration of operation, details of design, etc. PENNSYLVANIA PUMP AND COMPRESSOR CO., Easton, Penn.

Method of Installing No. 2½ Reversible Ventura Fan and Permanent Wall Fixture. AMERICAN BLOWER CO., Detroit, Mich.

Metal Laths. Broadside sent out on the Better Plaster Campaign for 1926 by the NATIONAL COUNCIL FOR BETTER PLASTERING, Chicago, Ill.

Electric Blasting. Explosives Service Bulletin No. 10 on the ways and means of avoiding trouble in this method of firing explosives. Illustrations of connection methods and excellent elimination chart for locating blasting troubles. E. I. du PONT de NEMOURS CO., INC., Wilmington, Del.

Cement Products Improver. Bulletin on advantages gained by cement products by addition of cement products improver manufactured by the GREAT LAKES INDUSTRIAL LABORATORIES, Toledo, Ohio.

Vibratory Screen. Bulletin No. 25 describing and illustrating Pittsburgh Vibratory Screen for separation and sizing of materials. Data on construction and arrangement in single and tandem. Details of capacity, method of erection, etc., 12 pp., 8½x11 in. PITTSBURGH COAL WASHER CO., Pittsburgh, Penn.

Resistance Thermometers. Catalog No. 92. Reproduces in actual colors the complete newly designed line of Brown resistance thermometers, and pictures and describes in detail the new Brown continuous recording resistance thermometers; list prices, etc., 20 pp., 8x10½ in. BROWN INSTRUMENT CO., Philadelphia, Penn.

Instructions for the Installation and Care of Thermo-Electric Pyrometers. Completely covers the following subjects: The theory of thermo-electric pyrometry, installing pyrometers, instruments installed ready for use, such as indicators, and continuous recorders and checking pyrometer installations. Conveniently indexed, illustrations in half-tone and line. 80 pp., 6x9 in. BROWN INSTRUMENT CO., Philadelphia, Penn.

Effect of Size and Shape of Concrete Test Specimens

BULLETIN No. 16 of the Structural Materials Research Laboratory, Lewis Institute, Chicago, by Harrison F. Gonnerman, associate engineer, deals with the important matter of the proper size and shape of specimens of concrete which are to be tested for compression. The standard test piece is a cylinder 6 in. in diameter and 12 in. high and the investigation proves that this is a satisfactory size and shape provided the aggregate used is limited to 2 in. or less in diameter. For larger sizes of aggregate a larger cylinder should be used and the rule is laid down that the minimum diameter of the cylinder to be tested should be three times the diameter of the largest piece of aggregate.

In making these tests 1755 specimens were broken. Sand and gravel from Elgin, Ill., and sand and Chicago limestone were used as aggregates. The tables which give the test in detail are very complete and include the water ratio and the fineness modulus of the aggregate. All samples were mixed to about the same relative consistency, 1.10, except those where different consistencies were tested. The proportions were by volume but the volume of dry and rodded aggregate was first determined and the quantities for each batch were weighed out.

Some of the conclusions obtained were:

For cylinders of length equal to 2 diameters, lower strengths were generally obtained with the larger cylinders. The decrease in strength with size of cylinder was not important for diameters of 6 in. or less; 8x16-in. and 10x20-in. cylinders gave 96 and 92% of the strength of 6x12-in. cylinders.

Concrete cylinders having a ratio of length to diameter of from 0.5 to 4.0 gave the following average strength-ratios at 28 days:

Ratio of Length to Diameter						
0.5	1.0	1.25	1.5	2.0	3.0	4.0
Strength-Ratio, percentage of strength of 6x12-in. cylinder						
178	115	107	103	100	95	90

These strength-ratios agree with those reported by other investigators. The difference in strengths of cylinders having ratios of length to diameter between 1.5 and 2.5 was not important.

The 6 and 8-in. cubes tested at ages of 7 days to 1 year gave strengths averaging 18 and 13% higher than 6x12-in. cylinders. The strengths for 6x12 in. and 8x16 in. prisms were lower at all ages than that for 6x12-in. cylinders; the strength-ratios averaged 93 and 91%, respectively.

For all forms of specimens the compressive strength increased with age for moist curing. For cylinders and prisms of length equal to twice the diameter or width, the 7-day, 3-mo. and 1-yr. strengths averaged 52, 152 and 178% of the 28-day strength for 1:5 concrete. The corresponding percentages for 6 and 8-in. cubes were 60, 129 and 165%.

A Comparative Study of Paper Fillers

FILLERS, as the term is used in the paper industry, are finely divided substances added to paper to fill up the spaces between the fibers composing the sheet. These fibers lie in a tangled mat separated by relatively large spaces. A good filler has sufficient range of particle sizes to fill the interstices, and at the same time it gives the sheet certain physical characteristics (opacity, body, finish) especially desirable in some grades of paper. In fact, in the case of book papers, fillers have come to be regarded as a necessary constituent because of the improvement in printing quality which they bring about.

Commercial paper fillers, consisting of asbestine, talc, clay, crown filler and gypsum, have been studied as to their comparative paper-making value, using the semi-commercial paper mill of the bureau. The percentage of filler added was varied, the amounts being 10 and 20%, by weight, of the beater finish. The paper produced was tested for weight, strength, color, opacity, finish, degree sized (non-absorbency) and amount of filler retained.

Asbestine, talc and clay were found to have similar paper-making properties. Crown filler and gypsum, however, being soluble in water, yielded somewhat different results from the other (insoluble) fillers.

Retention was less for the soluble materials and, in general, the differences noted in the characteristics of the papers were due chiefly to the difference in the amount of filler retained. The sizing process and the other paper-making operations were not adversely affected by any of the fillers employed. Complete details of this study are given in Technologic Paper No. 301, now available. "A Comparative Study of Paper Fillers," by M. B. Shaw and G. W. Bicking (Government Printing Office, Superintendent of Documents, Washington, D. C., price 10 cents).—*Technical News Bulletin, U. S. Bureau of Standards.*